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# JOURNAL OF GAS LIGHTING & WATER SUPPLY.

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## EDITORIAL NOTES.

### Central Organization—A Chapter of History.

RUMOURS have been current the last few weeks as to the question of better, more effective, and more comprehensive central representation for the gas industry being again forced to the surface—this time by circumstances that are likely to have very considerable weight. This is a matter that ought to have been settled long since; and now that the industry finds itself in the midst of changes that may have an important bearing on its fortunes, it also finds itself with no truly representative body that can speak and act for the whole of the interests involved. An Institution with a membership of engineers and managers (whose duties are executive and advisory) cannot claim to be representative of administration and finance, or controllers of the purse-strings of the industry; a British Commercial Gas Association, whose functions are devoted to the extension of the use of gas, and a defence of gas when need demands, cannot claim to be representative of all interests; a Society of British Gas Industries (though the title is one that provides a spacious covering) is limited in membership to makers of gas plant and appliances, and does not embrace other interests, although co-operating in their advancement; while other Associations identified with the industry have only circumscribed and well-defined jurisdiction.

It is not astonishing that the question of a really central representative organization has again risen to the surface, and especially at this momentous time; nor is it surprising that the administrative, financial, and commercial elements of the industry—and they are anything but negligible quantities—are showing signs of insisting upon a proper recognition and a proper place in the central work of the industry. We do not blame them. If this insistence is being found awkward in some quarters, it is only the result of procrastination—of a shelving of something that ought to have been accomplished before, but was repugnant in the main to certain individuals who thought more of their personal dignity, and of a conservation of a tradition and custom of the unsoundness of which new conditions have brought complete proof, than of the common, deeper, and material interests of the whole industry. There were also those who were jealous of the maintenance of the individuality of their separate organizations, and of their power of special action. There was no single objection that could not have been overcome by the establishing of a central body which bonded together the sectional elements; but this idea was for a time discarded, though it has a large number of adherents. However, the matter has come to a stage now when it is likely that those who have so long attempted to frustrate the movement for better central representation will simply be thrust aside, and the movement will go forward in spite of them, unless a satisfactory proposal is forthcoming from present headquarters. There has been the opportunity for doing something effective any time in the course of the past seven years; but on the nature of that "something" we will keep an open mind while the matter is under discussion *in camera*. At the same time, one is not called upon to keep mute for long, especially when it is known that at any time some schismatic happening may, in the event of further procrastination, have a forceful way with it. Apart from all other considerations, the matter is one that should, in the general conditions of the times and the circumstances of the industry, be dealt with seriously with a view to the ends of strengthening the industry for effective work, of defending its status, and of creating a body that, through complete representation, commands the respect and the recognition of the powers that be, and of all cognate bodies.

We have said that this matter might have been dealt with, with happier and more effective result, any time the last seven years. It was on July 20, 1909, that the question was first raised in an editorial article in the "JOURNAL," bearing the interrogative title, "Is Better Organization "Needed in the Gas Industry?" In that article, the examination of the position resulted in an answer wholly and positively in the affirmative. There was little public notice taken of the article at the time. But we happen to know that many recognized that the indictment as to the inadequacy of central organization was well founded, and that the writer was labouring under no misconception. The article had its suggestive effect; and eleven months later, Mr. James W. Helps made the subject a feature of his Presidential Address to the Institution of Gas Engineers. Again on Dec. 19, 1911, a further editorial article bearing on the question was published, under the title of "Broaden-"ing the Basis of Central Organization." The tortoise-like movement of the Institution in connection with a resolution passed in 1910 as a result of Mr. Helps's address would have done credit to, and might have been envied by, bureaucracy in red-tape wrappings. The resolution of 1910 asked the Council to appoint a Special Committee to consider the suggestions contained in the address, and prepare a report for presentation to the members dealing with the future work of the Institution. A Committee on Reconstitution was appointed; and by the time the members met in 1912—two years after the delivery of the address in question—they had arrived at the conclusion that the time was not opportune for making any such recommendations to the members as those indicated in the resolution of 1910. The approaching advent of the British Commercial Gas Association was one reason for this decision. But—the irony of fate!—this Association has been the means of showing administrators and those holding the purse-strings of gas undertakings how inadequately their part and place in the industry had been and were represented in the organization that had hitherto been dominant, more through seniority than through the completeness of its constitution as representative of the whole interests of the industry. However, to the decision of the Committee on Reconstitution, there were considerately added the words: "Thus the whole question of central "organization to embrace the industry generally is left open "and untrammelled for future treatment as occasion may re-"quire." Only one year passed. At the Institution meeting in 1913, the question was revived as to the establishment of a National Gas Institute; a year later the Council reported that they were not in a position to make any recommendation upon the question. But there were those who thought that, if the Institution desired to maintain its special technical character, there was another way—and it is not the only way—of securing a central representative body empowered to work and act for the industry, and that was by the Institution, the Society of British Gas Industries, and the British Commercial Gas Association, setting up a representative Central Council. The attempt to thus synthetize in representation the interests of the gas industry also met with failure. Again there were obstructives, again the old fears arose as to individuality being suppressed, though the contemplated Central Council, it was concisely explained, was to be "a permanent body, to consist of repre-"sentatives of the three organizations named, with the "object of safeguarding and promoting the interests of the "gas industry whenever circumstances arise which render "joint action desirable." But once more the report thereon of the Institution Council vaguely hinted at difficulties, and of the immaturity of the time. "A feeling," the Council said, "was expressed by the majority of the Joint Committee "that certain difficulties presented themselves, and that the "time was not yet ripe for bringing the matter to a "conclusion."

This is the history in brief of the matter, on which there have from time to time been other articles in the "JOURNAL." The industry has for long laboured under the incompleteness of the representation of its interests. Had it been otherwise, many of the heavy difficulties which have been experienced would have been reduced to comparatively simple

matters. But there were those who blindly persisted that the old ways were best; those who could see nothing in the new conditions to warrant any change. The very existence of the British Commercial Gas Association, the representation on its General and Executive Committees, and its financing constitute the best disproof of the soundness of the contentions. The orbit of the Association, however, is limited; and what is wanted is something which can bring complete representative power to bear upon any and every question which may arise touching the affairs of the industry, and which will insist upon its work being dealt with in truly business-like fashion—in short, an organization which will be potently influential and effective.

## The Budget and the Sliding-Scale Proprietor.

The war has to be paid for; and we have all to bear a share. In every quarter, we are doing so directly and indirectly. But the incidence of higher expenditure and taxation is, we have on previous occasions pointed out, unduly severe on the proprietors in sliding-scale gas companies, through the dual causes of the reduction of dividend consequent on the increase in the price of gas, and the heavy income-tax. Through this combination, the sliding-scale proprietor is finding the return upon his investments incrementally diminishing in a manner which means that he is, in these stressful times, paying more than his share in comparison with investors in other enterprises in which the prices of commodities can be raised without a reduction of dividend, and especially in comparison with those enterprises in which "excess profits" have been obtained. We are not sorry that the gas industry cannot advance its gas prices so as to make excess profits through the war; but we do continue to hold the opinion that, in a time like the present, there ought to be a partial suspension of the sliding-scale, so as to modify the effect of the war charges upon the gas investor in sliding-scale companies.

Now the tax upon unearned incomes is to be 3s. in the pound upon incomes not exceeding £300; 3s. 6d. between £300 and £500; 4s. between £500 and £1000; 4s. 6d. between £1000 and £2000; 5s. for over £2000. These figures show how hard hit will be the smaller investors; and in the gas industry we have a very large number who are dependent on modest incomes derived from invested savings, which modest incomes are to-day being strained as never before. The hardship is intensified by the fact that in all cases the maximum income-tax of 5s. is to be deducted at the source, which means that all those with incomes below £2000 will, if they desire a return of the difference between the amount deducted and that actually due, have to appeal for its return. We can see the Somerset House department getting into a fine mess over this plan. Mr. M'Kenna says that wherever possible any allowance due on unearned incomes will be made by adjustment in the assessment in respect of earned income, where there is any. In view of this, he does not expect that additional claims for reduction of income-tax paid in excess of the amount to which the subject is liable will be large in a normal year. Of course, we do not know from whom the Chancellor of the Exchequer obtained his information; but, in view of the preponderance of investors with small capitals over investors with large ones, we incline to the view that his opinion is ill-founded. Perhaps he is depending upon the aversion that the public has for appealing to the Income-Tax Commissioners in the matter of over-assessments in view of the notoriously sluggish manner in which matters of the kind are dealt with and adjusted. With the 5s. deduction, there are proprietors in some important sliding-scale gas companies who will, through the reduction of dividends owing to the rise in the price of gas, find their dividend warrants coming to them showing the exiguous return of only between 3 and 3½ per cent., and with the obligation upon those who cannot boast of an income of upwards of £2000 (unless they wish to forfeit the difference) of making an appeal to Somerset House for the return of the excess income-tax charge. The position of the sliding-scale proprietors does not get happier in these times.

It is pretty certain that under these conditions, and with the difficulty of securing sanction to capital-raising, the directors of gas companies (whatever they may have done earlier in the war) cannot now accept the advice of the Treasury that reserve funds of any description should be invested in Government securities—bonds bearing 5 per cent. interest, and subject to an income-tax of 5s. in the pound; thus returning upon the investment only £3 15s. Directors of gas companies can make more profitable use of such money within their own undertakings. As a matter of fact, high financial authorities are looking very gravely upon the upward flight of income-tax, in view of further necessary war loans. The burdens of the times, including the heavy income-tax, are killing the power of saving and the power of investment among the middle classes. The business man and the financier will only be induced from patriotic motives to subscribe to further war loans; but it will be a big wrench for them to do this while other more lucrative investments at low market prices invite consideration. Perhaps one of the fairest things in the whole Budget is the raising of the proportion of excess profits tax from 50 to 60 per cent. Mr. M'Kenna thinks that this is as far as he can go in this direction, in view (among other reasons) of the risks that have been taken by manufacturers. At the same time, there have been cases in which large excess profits have been made without any particular risk, and in which the whole might well be confiscated without doing harm to anyone. However, the increase to 60 per cent. has been generally welcomed by everybody who has not made excess profits, and is not likely to do so.

## Residual Products Restrictive Clause.

In our "Correspondence" columns to-day, there appears a letter, signed "Compromise," on the subject of the gas industry's difference with the chemical manufacturers. The letter contains a proposal which cannot be regarded as either a "compromise" or a "remedy," but only as an unnecessary infliction of an additional obligation on gas companies, which suggests further guardianship over them, as though their technical advisers and officers and administrators were a set of incompetents who ought not, without careful watching, to be trusted with the management of their affairs. The effort of "Compromise" at presenting a case for setting-up means of satisfying the parliamentary authorities that gas consumers are not being injured by carrying to a further stage the development of the working-up of residual products—at the place of production, or as near to it as possible—is an excellent illustration of the limiting influence produced upon one by taking a narrow point of view. We wish we could seriously think that those who have had anything to do with the framing of clauses to restrict the gas industry in this matter only regarded it from the standpoint of the effect it would have upon the balance-sheet of a gas undertaking, and therefore upon the gas consumers. If this were so, the clearing of the position would be a comparatively easy matter. But when in every stage of this controversy, the clauses drafted have been with the view to remove entirely or to limit the industry's inter-purchasing powers of crude residuals, thus leaving powers of purchase wholly or largely in the hands of the chemical manufacturers, it is plain that other considerations than the welfare of gas consumers have been dominant. Not in any single instance do we remember the chemical manufacturers seriously attempting to prove that the administrators of gas undertakings would be foolish enough to pursue a course likely to be injurious to the gas consumers. On the contrary, the "speculative" business which they were so anxious that gas undertakings should not indulge in, they vigorously tried to preserve for themselves, or, at any rate, to the extent of being constituted by Parliament sole purchasers, without themselves being troubled or trammelled by statutory regulations. We assert very deliberately that the interests of the gas consumers were not the only ones considered; the interests to which greater consideration was given were those of the chemical manufacturers, who, in this "speculative" business, were so happy that they did not wish producers of the crude materials to further share in it. What the chemical manufacturers desired to make extremely "speculative" for gas undertakings that were not individually equal to the working-up of their own bye-products were the prices that they would receive for the crude materials.

"Compromise" evidently leans strongly to the opinion that this is a "speculative" business; and he also appears to take a very limited view of what constitutes the "trade" of a gas undertaking. Limited views of the kind are apt to warp judgment as to what is right and fair. He says it was "shown that gas companies were a specially protected "community without competition in their own trade." Who "showed" this? The gas undertakings are only pro-

tected in regard to the supply of gas—not as purveyors of agents for light, heat, and power. In this relation, too, it is just as well to be on sure ground as to what constitutes the "trade" of a gas company. Their "trade" is not limited to gas; other products are an integral part of the trade. If they were not, gas undertakings would have to shut up "shop" so far as the primary part of their business goes, for gas could never be sold at a competitive price. And what gas companies claim the right to do is to carry on their composite trade in the most economical manner, and with the best effect. But this right is what the chemical manufacturers and those misled by them would deny to gas undertakings, though, in the considered opinion of their technical advisers, its exercise would be in the interests of the gas consumers. We cannot separate up the "trade" of a gas company; each part is essential to the other. Our correspondent also speaks of a gas company's capital being raised for the "legitimate purpose" of the business; thus inferring that the making of the most profitable use of the secondary products is not a "legitimate purpose." Here, again, our correspondent shows a distinct leaning towards the case that was put forward by the chemical manufacturers, when he says that "it is reasonable to admit that "a good point against gas companies was made when it "was shown that capital and revenue, in which the gas "consumer was largely interested, were to be employed in "a trade without a proper showing as to whether or no it "was to the advantage or disadvantage of the community." Did not the vigorous action of the chemical manufacturers disclose to our correspondent that the filching of the liberty of the gas companies would take away from them something which the chemical manufacturers deemed of considerable importance to them? And surely anyone who knows anything of gas residual products must be aware that, dealing with them in sufficient quantities as near as possible to the source of their production, is an economic proposition, in view of the cost of transit to a distance of the raw material, and particularly when the distant buyers of the raw material are not subject to competitive conditions in making purchase.

The Joint Committee of the two Houses who considered in detail the whole of the questions at issue, were not convinced that anyone would be injured by maintaining freedom in the matter of the disposal of the residual products; and they manifestly did not see that anything pointed to the working-up of residual products in sufficient quantities being more speculative for gas supply undertakings than for chemical manufacturers. Moreover, the "speculative" argument has since then been considerably discounted by certain modern developments. No one knows better than our correspondent that this is so. Service to the country in the matter of the supply of materials for explosives making, with the installation of plant for increasing supplies, and separating the essential products from the crude tar, has opened-up the road to developments. Furthermore, it is hoped that the crude tar will not again find its way to road making and surfacing; and the very work the gas undertakings are now doing in the national cause is a local advantage in the supply of refined tar. And after the war, the same materials that are required for war service will be needed for the production of dyes, and benzol will be increasingly sought for motor fuel. The Joint Committee did not make it a condition precedent to the development of the residual products business of a gas company that it should be constituted a self-contained entity, as in the case of an electricity supply business carried on by a gas company. There is no analogy. Electricity there is in competition with gas. The residuals products business is not. It is indispensable to the gas-supply business; and it has been developed to various extent by gas undertakings. All that the gas industry has done has been to defend its right to develop the residuals business on what is conceived by those who have on them the responsibility of directing gas undertakings to be the most beneficial lines. The suggestion as to distinct accounts is made, we take it, for application where full liberty prevails as to dealing with residual products; but it only appeals to us as something totally unnecessary. Gas manufacture and residual products are so united that there would be some difficulty in so completely separating them as to set the residual products apart as a "self-contained entity;" and we see no reason for trying to do so outside the private books of the undertaking. On the other hand, we do see reasons why the figures should not be disclosed to competitors, who would be the hostile chemical manufacturers. The suggestion that they should be so disclosed is one of the surprising features of the letter of "Compromise." The gas industry can only voluntarily consent to any limitation of its liberties by obtaining through it an enhancement of its security.

## War Conditions and Carbonizing Economy.

When Mr. A. Mackay, of Motherwell, set himself to the task of preparing an address for reading and discussion at the Informal Meeting of Scottish Gas Managers, he did so to a length distinctly embarrassing to the Technical Press, and transgressed entirely the appeal, made in our columns on Feb. 29 (p. 456), for co-operation in these times of difficulty. The result is we have had to curtail to a material degree the extensive work of the author.

It will be seen from the abstract that primary place was given by Mr. Mackay to the consideration of matters affecting the operations of the industry during war time—matters which are uppermost in the minds of all who are, as chief officials, technically and commercially responsible for the best working issues from the undertakings under their charge. Still, in discussing these matters, one need not, in any single respect, adopt any very sympathetic attitude towards the coalowners. They have proved themselves quite capable masters of the art of looking after themselves. Mr. Mackay applauds the Government for what they have done in defending the interests of home consumers of fuel during war time. He also regards the Price of Coal (Limitation) Act as something that was necessary to gas and manufacturing interests; but he recognizes that it has its anomalies. Under the Act, there is no regulation of the price of coal sold for export; and as some collieries are not well circumstanced geographically for export trade, it is suggested, in the address, that it remains to be seen whether some provision will not be made for those whose special circumstances "render necessary an extension "of the statutory 4s. in order to ensure a continuance of "working." We have heard of such collieries ever since the Act came into force. For them most disastrous results were originally predicted; but certain pits which we happen to know were specially numbered among the unfortunates, are still merrily running, and no doubt are making a very respectable living by trading operations on the open market. There is no particular occasion for buyers, however much they are animated by a sense of justice, to suggest that there are really deserving cases for an increase of the 4s. standard. Some coalowners have been hankering after its increase almost from the time the Act came into operation, notwithstanding that the Board of Trade Coal Prices Committee, Mr. Runciman, Sir Arthur Markham, and others showed some months ago there was a margin for all collieries in the 4s.—variously estimated at from 1s. to 2s. per ton. Since then, it is true, there has been an increase in miners' wages, pit props have gone up in price, and other expenses have risen; but when the additional costs on what obtained at the time the Act came into force are reduced to the per ton basis, the 4s. standard price (dividends are eloquent in their attestation) has not yet been exhausted in many (if any) cases. If so, the exceptional collieries can look after themselves, and so can those which are not so classified, as was seen in the article last week on "The Coal Situation" (p. 10). What has to be done, if possible, is to checkmate the efforts of those colliery owners who by finesse are trying to reap larger profit than that to which they are entitled. This is of more present importance than speculating as to the probable course of the coal market after the war. The operation of the Price Limitation Act is for the duration of the war and six months after; and it will take all the marginal period to get the miners who are now in the field, and who return fit, settled down in their old employment.

The policy that Mr. Mackay favours in regard to the marketing of coke and sulphate of ammonia is excellent in its prudence. When considering the present, we should not overlook the future. Good prices are now being obtained for coke. It is right this should be so with the heavy cost of the raw material from which the coke is made. But with an eye on the future, it is urged that consumers should not be antagonized by exacting from them, during these times of general pressure, the utmost shilling per ton. In regard to sulphate of ammonia, there is recognition of the wisdom of the campaign of the Sulphate of Ammonia Association in favour of the production of a quality salt of the standard required by foreign consumers. It has to be borne in mind

that the satisfaction that we can give to consumers abroad during the enforced absence of the Germans as sellers will be of the greatest possible value in the competitive time that is coming. A drawback to doing this is the position of sulphuric acid supplies, and the enforced use of nitre cake—a matter to which reference is made elsewhere.

The whole of the current conditions and prospective ones compel observance by gas engineers and managers of all possible means to economy; and readers will be interested in what Mr. Mackay has to say respecting the economy of vertical retorts—the type he has installed at Motherwell being the Wilson continuous-intermittent system. Compared with his old horizontal conditions, through increased make of gas per ton, and reduced labour expenses, despite the lower total quantity (owing to the reduced amount of coal needed) of tar and ammonia produced (both of which are in quantity greater per ton, and of better quality), he shows a saving of nearly £5000 on a make of 250 million cubic feet per annum. But there is horizontal working and horizontal working; and if the figures as presented for the verticals were placed in contrast with the working with machine operated horizontal retorts in many other places, the difference of £5000 would shrink very seriously. The address took a very wide sweep of contemporary gas topics, and so gave considerable scope for discussion.

## Central Technical Gas Research Association.

Incidental reference was made in last week's issue to the suggestion put forward by Mr. Thomas Glover (of Edmonton), at the meeting of the Society of British Gas Industries, regarding the establishment of a Technical Gas Research Association. Similar suggestions (not exactly in this form, but all directed to the same end) have been made at intervals over a long course of years by different people connected with the gas industry. But nothing has ever been done; and now, as then, gas research is much a matter of individual enterprise, with supplementing it the work that is done at the Leeds University. But Mr. Glover goes farther than his predecessors in his ideas of what is required. In the first place, the question of research should be in the hands of a Central Association composed not only of representatives of gas-supply undertakings, but in addition of the manufacturers of gas plant and appliances. There is much reason for joint effort, as anything that tends to development in gas economy and efficiency or new applications is all to the common good. Therefore, Mr. Glover sees not only scope for investigation on the gas manufacturing side, but in connection with the appliances by which gas is consumed. Utilization of gas is to development as fundamentally important as the manufacture of gas; and so no words are necessary to show that research should not be confined to one side only. But such an Association would require very considerable funds. It would be no use setting about such a work as this in a peddling manner; and it would, we are afraid, be a difficulty (although it should not be) for some time to come to get guarantees of subscriptions of a sufficient order to enter upon the work in a serious and bold manner. What is wanted, preceding the taking up of a scheme of technical research, is the central general organization of the entire industry (to which matter an earlier article is devoted). Given this, there would be an influential body who could consider and present a scheme to the whole industry, with some probability of success. However, Mr. Glover sees great possibilities in the scheme; and so do we. He therefore invites expressions of opinion upon it (it will be a pleasure to publish any); and he also suggests that the matter should be the subject of consideration by the three organizations mainly concerned.

## Redeemable Stocks and Redemption Funds.

The Bill of the South Metropolitan Gas Company was before the Unopposed Bills Committee last Thursday; and to-day in our "Parliamentary Intelligence," the financial clauses are printed as they have been passed. The Company are authorized to issue redeemable preference and debenture stock; but we miss from the clauses the section that appeared in the Bill as originally lodged, providing for the setting-up of a redemption fund by appropriating from revenue such sums as the Directors considered necessary. The excision of the redemption fund clause suggests that the Lord Chairman has come to the conclusion (as we foreshadowed he might) that, in the case of sliding-scale companies the provision of a redemption fund cannot be permitted, but that redemption must take place by issuing other stock—raised, if possible, on easier terms. We discussed this matter last week, and could not then, nor can we now, see why there should be any differentiation between sliding-scale gas companies and other companies. The consumers under the sliding-scale provisions are extraordinarily well protected. In our "Correspondence" columns, Mr. W. R. Herring supplies another argument in favour of the sliding-scale companies being allowed to provide redemption funds for liquidating redeemable stocks; but we are afraid his suggestion has come too late to be of any avail, if (as we suppose to be the case) the Lord Chairman has made up his mind on the point, and has pronounced in favour of "redeemable" stock being a perpetual burden upon an undertaking, by "redemption" simply meaning the displacement of one stock by another.

## Munitions Work and Transferred Custom.

During the war good resolutions are being made regarding the question of trading with the enemy when peace is restored. It is hoped they will be faithfully kept. There is one other that should be made in respect of the patronage of British firms. We find several cases of gas apparatus firms who have had their works requisitioned for the making of munitions to such an extent that they are helpless in the matter of meeting the orders of regular customers. The natural result of this is that as the old customers cannot afford to wait for supplies, they have to obtain them from other quarters; and some very good orders have been placed that would otherwise have gone to the firms who obtained and retained the patronage till the country claimed their services. A good resolution that should be made by the managements of those gas undertakings who have, through the cause named, been compelled to transfer their custom is that, when the old firms have been released from munitions work, they will restore to them their patronage until, if ever, some other cause than the present disability arises to warrant the transfer of orders. It would be an ill-requital for the national work upon which such firms have been engaged, if it were allowed to be the reason for making them permanently suffer loss of business.

## The Revised Lists of Certified Occupations.

We have extracted from the revised lists of reserved occupations, and publish in other columns, all the modifications that have been made which appear to affect in any way gas undertakings, gas-works contractors, and manufacturers of gas plant and appliances. Amendment of the pre-existing conditions regarding men who were exempt from military service covers the lists; and by all concerned very careful study should be made of the changes. Reinforcements must be had for the Army and Navy; and at the same time essential industries must be kept going. The Committee on Reserved Occupations have, therefore, not had an enviable task in sifting-down the men in exempted occupations; and no doubt they have tried to hold the balance judicially. With the conclusion, for the present, of their work, the warning is given that there may be further revision as the industrial or the military situation demands. Readers should be careful to note the remarks that precede the revisions that have now been effected, as given in the introduction to the extracts we have made from the lists. It will be seen that all classes of workmen engaged inside gas-works are as formerly preserved to the industry—this doubtless being due to the appreciation by the Committee of the fact that, if gas manufacture is disturbed, so would be the production of the maximum quantities of benzol, toluol, and other requisite chemicals. But regarding the district men, there is an important matter to which we wish to draw pointed attention. It is

## The Case of the Gas-Fitter.

Concerning this essential individual—quite as essential as the man inside the works, to the maintenance and increase of the output of gas—there appears to be some misconception. Gas-fitters in the revised lists are only mentioned under the cross-heading "Metal, Engineering, and Shipbuilding," and not under that of "Public and Public Utility Services," which include gas undertakings. It may therefore be fairly taken that the *status quo* of gas-fitters employed by gas undertakings has been so far maintained. Under the "Metal, Engineering, and Shipbuilding" section, the revised list exempts fitters (excluding stove, grate, and range fitter) and metal pipe fitters (excluding gas-fitter and

plumber)—that is to say, gas-fitters and plumbers engaged in the metal, engineering, and shipbuilding trades. If it had been intended that fitters engaged in the work of gas undertakings were to be specially excluded from exemption, then it would have been so stated under "Public and Public Utility Services." Moreover, against the reference to gas-fitters in the revised list, the letters "M.M." appear; and for all occupations so marked the Ministry of Munitions are responsible. It would never do—and the Ministry of Munitions appreciate this—to constitute the gas-works gates the line of demarcation between essential and non-essential men. It is impossible to get sufficient gas-fitters above military age. With those that the industry possesses within military age, it has to-day a large shortage; and through this the consumption of gas cannot be extended as the Ministry of Munitions would like to see it. As an article published on March 28 (p. 676) showed, the Committee have ruled that mechanics engaged in the repair of gas mains and services, including those employed in removing naphthalene deposits, are covered by the reservation as to mechanics under the "General Exemptions in All Industries:"—"mechanics and similar men engaged in the maintenance and repair of their employers' plant, machinery, and tools." However, in respect of any indispensable district men, it is open to any gas undertaking to appeal; and, in the making of such appeals, there are two important grounds on which stand can be taken—that the men are essential if the supply of gas is to be maintained at the highest attainable level, which is necessary for the maximum yield of the ingredients for the manufacture of high explosives; and that the gas heating and power appliances in munitions works in any district must not be left without local skilled men to keep them in a state of repair and efficiency, and to be available in the case of emergency. Another point of importance to the gas industry is the recommendation of the Committee (see the end paragraph of the extracts from the lists) as to clerks with technical knowledge.

### Nitre Cake for Sulphate of Ammonia Making.

The use of nitre cake for sulphate of ammonia making, notwithstanding the inferior product and the extra care required in its use to avoid dangers, has become a matter of Hobson's choice. With great reluctance the Sulphate of Ammonia Association have to admit that, from the point of view of both national and private interests, the substitution of nitre cake for sulphuric acid has to be accepted, but subject to certain conditions, which they set forth in a circular issued last week. It is a sore conclusion, in view of the work the Association have done in promoting the manufacture of a quality of sulphate of ammonia of a higher standard than that commonly obtaining hitherto in respect of ammonia, free acid, and moisture. It will be as well, in the interests of the market, if attempts be made to comply with the guiding counsel of the Association rather than with that contained in the memorandum issued by the Ministry of Munitions. But it is doubtful whether in all cases there will be ability to do this. In the memorandum of the Ministry of Munitions, it was mentioned that, using nitre cake, the ammonia content of the sulphate would be reduced to from 18 to 20 per cent.; but the Association recommend that not less than 24 per cent. quality should be made, unless forward contracts can be effected with manure mixers for lower qualities. There are coke-oven managers, however, who find it difficult, under the conditions of their working to make with nitre cake a higher quality than 18 per cent. Then the free acid and moisture are higher in the sulphate produced with nitre cake; and such percentages will have a bad effect on bags, and make transport difficult. The Association speak of the necessity of guarding against nitric acid dangers, give information as to the quantity of nitre cake to be used, and mention the difficulties arising from exceeding the prescription. The position is one which cannot be resisted; but the results and difficulties are such that makers will not regard the use of nitre cake as anything more than a compulsory expedient, to be promptly abandoned at the end of the war.

### Municipal Activity in Another Form.

Even those who are of opinion that at times there are municipalities who evince too strong a desire to undertake new duties, and to carry on services which might be as well or better performed by private enterprise, will admire the spirit in which the Finance Committee of the Birmingham City Council have approached a proposal to start a municipal savings bank, which was made in the first instance by the Lord Mayor (Alderman Neville Chamberlain), who suggested a scheme to the Committee. This scheme was looked upon with a kindly eye by the Committee; and last week the Council adopted it, subject to the necessary statutory authority being obtained. Like many other places, Birmingham must be particularly prosperous just now; and much more money than usual is no doubt going to those people who in a general way have little to save and even less inclination to save it. While the war finance policy of the Government has catered well for others, the Committee feel that no plan hitherto suggested seems exactly to fit the case of the class here referred to. The idea of the Lord Mayor is that the Corporation would be serving a useful purpose if they could induce this type of man to place a portion of his earnings at the service of the State, and thus acquire the habit of saving. The scheme is to be open to the employees in any factory, shop, or office in the city. That is, the Corporation would have a savings bank in which these persons could make deposits derived by deductions from their wages. The money will be invested with the Government; but an essential feature of the scheme is that depositors may withdraw their money at any time without loss of principal or interest. Provided the requisite statutory authority is granted, the scheme should be certain of a thoroughly favourable trial, inasmuch as assurances of active and cordial support have been received from responsible officers of trade unions, representative employers, and bankers. The Central Committee on War Savings also express approval of the proposal; and as they think that the scheme might well be adopted by other towns, the experiment of Birmingham, if it is tried, will be closely watched. The suggested interest is 3½ per cent., which will be paid without deduction of income-tax. In considering the rate of interest, of course, it must be remembered that to satisfy the undertaking that depositors may withdraw their money at any time, a substantial portion of the receipts must be kept in hand by the Corporation, so as to be instantly available. One thing is quite certain, that in Birmingham the workers will have little fear in placing their savings in the hands of the Corporation—with the rates behind them.

## OBITUARY.

It is reported that Mr. ADOLF L. AHLSELL, formerly Chief Engineer of the Stockholm Gas-Works, died on Feb. 2, having reached the age of 71 years. He bequeathed the sum of 10,000 kroner [about £560] to the workmen engaged at the gas and electricity works at Stockholm.

The funeral took place on Thursday afternoon, at Bushey, of the late Mr. ERNEST DOCWRA, of the well-known firm of gas and water engineers, Messrs. T. Docwra and Son, Balls Pond. After a long illness, Mr. Docwra died at his residence, Heathdene, Langley Road, Watford, in his fiftieth year, leaving a widow and young son. Among those present at the funeral were representatives of the Metropolitan Water Board and of the Colne Valley Water Company.

The death occurred on the 17th ult. of Herr WILHELM ZOBEL, of Loschwitz, near Dresden, who was formerly a gas-works manager, and is credited with having been the first—when in charge of the Lodz Gas-Works in 1893—to propose that the flow of gas through the purifiers should be divided into two streams, in order to effect a doubling of the surface area in the vessels, and thus secure more prolonged contact of the gas with the purifying material. Herr Zobel was a Knight of the Order of Albrecht in the First Class.

## PERSONAL.

Mr. JOHN CHISHOLM, Water Engineer, Airdrie, N.B., was at last Tuesday's meeting of the Institution of Civil Engineers elected a Member.

Among the staff changes notified in the current issue of the "Co-Partners' Magazine" of the Gas Light and Coke Company, it is stated that Mr. S. LACEY has been appointed as Assistant Distributing Engineer.

It was mentioned in the "JOURNAL" last August that Lieutenant G. D. BIDWELL had received a severe wound during landing operations at the Dardanelles. He is now, it is gratifying to be in a position to state, back in camp with his reserve battalion, after convalescing at Bournemouth. It is also pleasing to learn that he has been made Captain, the promotion to date back to Aug. 11 last year, when he was recommended at the Dardanelles.

Mr. E. J. K. FUSSELL has been appointed to the position of Secretary of the Tottenham District Light, Heat, and Power Company, rendered vacant by the death of Mr. E. Topley, and hopes to take up his new duties early in May. Mr. Fussell, who is a son of the late Rev. T. W. Fussell, M.A., has been connected with the gas industry for many years. He started his career in the gas-works

of the borough of Tiverton, and he acquired further experience while associated with the Rugby, Newport (Mon.), and Nantwich undertakings. During his secretaryship to the Nantwich Gas Company, the works were transferred to the Local Authority; and subsequently he acted for the Council for some years. Appointed to the post of Chief Accountant to the Croydon Corporation Electricity Department, he inaugurated a system of stores records and prime costing. For the last few years he has acted as Chief Assistant to Mr. William Cash, of Messrs. Cash, Stone, and Co., and has thus obtained a very extensive knowledge of parliamentary matters connected with gas, water, and electricity undertakings and transfers. He has also been responsible for the financial details relating to extensions of local government areas.

News has come to hand of the appointment of Mr. F. Elcock as Gas-Works Superintendent to the Ottawa Gas and Electric Company, where he has the advantage of being connected with a works which is up to date in every respect, having been erected as recently as 1915. Mr. Elcock commenced his education at the Dudley Grammar School, afterwards being a pupil to Mr. S. O. Stephenson, late of Tipton, and now of Worthing. Studying at the Birmingham Technical School, Mr. Elcock gained various certificates, including first class in both grades in "Gas Engineering," and the first ordinary grade in "Gas Supply," and a second in honours. He assisted Mr. Stephenson in getting out drawings and specifications for extensive reconstruction work; and later on added to this experience by spending a short time in the drawing office of West's Gas Improvement Company. Under an engagement with this firm, he subsequently superintended the erection of plant at various works in the British Isles and in Canada. As a matter of fact, he was responsible for the building of the Ottawa plant of 1½ million cubic feet capacity, prior to his appointment as Works Superintendent there.

Mr. Fred Bowen has been appointed Engineer and Manager of the Gas and Water undertakings of the Leigh (Lancs.) Corporation. He entered the service of the Borough of Leigh in 1900 as Pupil-Assistant to Mr. John Foster, who at that time was the Gas Engineer, and is now Engineer of the Windsor Street Works of the Birmingham Corporation. Mr. Bowen assisted with the remodelling of the Leigh Gas-Works, including new purifying plant, governors, &c. At this time, the Gas, Water, and Electricity Departments were joint undertakings; and Mr. Bowen also took part in electricity extensions. He continued at Leigh in the capacity of Assistant Gas and Water Engineer to Mr. J. Gibson (now leaving for Mansfield) until 1913, during which time he assisted with the installation of the carburetted water-gas plant, retort-bench alterations, and large extensions to the water undertaking. In 1913, he secured an appointment under the Home Office as Inspector of Factories, and has been stationed on the Manchester district. In this capacity he has been called upon to report on important chemical and engineering matters. He is relinquishing the post to return to his former sphere of labour. Recently his services were lent to the Admiralty in connection with the testing of steel and other materials for munitions. Mr. Bowen (who is 35 years of age) is a M.Sc. of Victoria University, Manchester, graduating first-class honours in 1900, after a three years' course. He was winner of a National and other scholarships, and holds numerous advanced and honours certificates of the Board of Education.

## QUARTERLY INDEXES TO THE "JOURNAL" VOLUMES.

We reprint from last week's issue the following paragraph, and direct special attention to the concluding lines.

In view of the shortage and enhanced cost of paper, and increased labour, printing, and postage charges, it has been decided to in future issue the quarterly indexes to the "Journal" only to those subscribers who express their desire to have them. It is proposed to keep a register of the names of those who signify such desire, and quarter by quarter a copy will be posted to them. In order that a calculation may be made as to the approximate number of copies of the index that will be required, readers are asked to send, not later than Saturday, April 15, a post-card expressing their wish to have their names recorded. Compliance with this request will prevent disappointment.

**Rates of Income-Tax.**—A White Paper has been issued showing the amount of income-tax payable on incomes—wholly earned, wholly unearned, and half earned and half unearned—from £131 upwards, and the virtual rate charged in the pound, under the existing law, and under the proposals made by the Chancellor of the Exchequer last Tuesday.

**Coalfield for Norway.**—Great satisfaction is expressed, says the Christiania correspondent of the "Times," at the news that a Norwegian Syndicate, with a capital of 10,000,000 kroner (£555,555), will purchase the American and Norwegian coal mines in Spitzbergen. It is estimated that the production of coal will increase up to an output of 200,000 tons annually; the needs of Northern Norway being thereby supplied. South Norway, with its industries, will still require English coal; but to some extent this dependence on English supplies could be removed by the use of waterfalls for the production of electric power.

## NITRE CAKE IN PLACE OF SULPHURIC ACID.

### A Memorandum by the Sulphate of Ammonia Association.

A memorandum on the subject of the substitution of nitre cake for sulphuric acid in the manufacture of sulphate of ammonia has just been issued by the Sulphate of Ammonia Association. Circulars by the Ministry of Munitions dealing with the matter will be found in the "Journal" for the 7th ult. [p. 523]. The memorandum of the Sulphate of Ammonia Association is in the following terms.

The Ministry of Munitions recently issued a memorandum with regard to this question which has met with somewhat severe criticism. After carefully examining the proposal, we feel unable to endorse the recommendation of the Ministry in its original form; but at the same time we are convinced that supplies of sulphuric acid available for industrial purposes will progressively diminish for a considerable time to come. This being the case, it is both to national and to private interests that all possible economy should be effected in the use of acid as such. We therefore feel it necessary to recommend makers of sulphate of ammonia to use nitre cake in substitution to the extent, and subject to the considerations, mentioned below.

Seeing that we have recently been appealing to manufacturers to make sulphate of ammonia testing 25 per cent., it will be readily understood that it is with the greatest reluctance that we feel compelled to issue these suggestions, which will involve the reduction of the percentage of ammonia to 24 per cent., and possibly less. We therefore wish to make it quite clear that we only advocate the use of nitre cake as a temporary expedient for the duration of the war.

Our recommendations are based on the practical experience gained at a large works which used nitre cake on a working scale over a considerable period. It will be seen that there are dangers to be guarded against, which are not apparent in mere theoretical or laboratory work. The average composition of the salt produced at the works was:

| | Per Cent. |
|---|---|
| Ammonia | 24·01 |
| Free acid | 0·88 |
| Moisture | 2·70 |
| $Na_2SO_4$ | 3·20 |

corresponding to a consumption of over 7 per cent. of nitre cake, equal to about 2½ per cent. of acid saved.

#### Disposal.

We do not recommend any attempt to produce a salt testing less than 24 per cent. ammonia, unless special forward contracts can be made with manure mixers for lower qualities. Seeing that the lower the content of ammonia, the higher will be the percentages of moisture and free acid, thus rendering transport difficult, works contracting with manure mixers should be situated as near to the latter as possible.

#### Supplies.

The principal supplies of nitre cake are situated in the counties or districts of London, Durham, Cumberland, North and South Wales, Glasgow and Edinburgh, Birmingham, Cornwall, Derby, and Hants. Owing to the extent to which other industries—notably the woollen industry—are using nitre cake, care should be taken to ascertain the probability of supplies being available in given districts. We are prepared to supply lists of nitre cake makers on application.

#### Nitric Acid Danger.

There are two sources of nitre cake: (1) From sulphuric acid plants; (2) from nitric acid plants. The nitre cake from the first source usually contains 20 to 35 per cent. of free sulphuric acid, with traces of nitric acid; and from the second source, 30 to 40 per cent. free sulphuric acid, and up to 2 per cent. or even more of nitric acid.

The presence of free nitric acid causes serious damage to the lead-work of the saturator, and ultimately destruction of ammonia; and too much care cannot be taken in guarding against the presence of this substance. The danger is emphasized at the present time, when nitric acid plants are very hard pressed, and it is not profitable to the nitric acid manufacturer to remove the last 1 or 2 per cent. of nitric acid from the nitre cake.

The maximum percentage of nitric acid in the nitre cake used by sulphate of ammonia makers should be 0·05 per cent.

#### Quantity of Nitre Cake to Use.

We do not recommend the use of a quantity of nitre cake exceeding 10 per cent. by weight of the acid, except in special circumstances.

The nitre cake should be dissolved in water until the solution shows 100° Twaddel at 200° Fahr. Mother liquor from the saturator may also be used for dissolving the nitre cake. This solution must be run into the saturator as hot as possible, and continuously with the acid. The best working strength is 80° to 84° Twaddel, and the salt produced will vary from 23 to 24 per cent. ammonia.

With the solution of nitre cake in water of the strength mentioned above, one volume of solution should be used with every ten volumes of 70 per cent. chamber acid, or its equivalent.

#### Difficulties if Larger Quantity of Nitre Cake is Used.

The difficulties encountered when using large quantities of nitre cake are as follows:

1.—Precipitation of sulphate of soda on adding the nitre cake to the saturator. This causes the production of an irregular quality of salt containing anything down to 15 per cent. ammonia.

2.—Irregular working of the bath, owing to the impossibility of control without frequent titration. The latter is not possible at the present time. The salt produced often contains 2 per cent. of acid after leaving the centrifugal machine; and in this case moisture is absorbed in store, and it is not possible to pack the product in bags.

When the quantity of nitre cake used is less than 10 per cent. by weight of the acid, these difficulties are partially overcome.

# LEGALITY OF GAS CONTRACTS IN WAR-TIME CONDITIONS.

### A Notable Case in France.

ABNORMAL as have been the conditions which have prevailed in this country for the gas industry since the outbreak of war, gas-makers in France, Italy, and other countries have been still more difficultly situated, for the cost and uncertainty of freightage have been felt by them in a particularly accentuated form. In many French towns the gas company carries on its business as the concessionnaire of the municipality, and in accordance with the terms of a contract drawn up at the time of the concession, and intended to safeguard the interests of the townspeople while providing a reasonable return upon the capital invested by the concessionnaire company.

At the time at which probably the majority of such contracts were entered into, the likelihood of circumstances provoked by a long European war of dimensions akin to the present one were not contemplated in adjusting the balance between the town and the commercial body entrusted with the exclusive rights for the supply of light and power. Hence within the past year there have arisen in France scores of instances where the exceptional conditions of the time have made a revision of the terms of the contract a matter of common justice. In some cases, the gas company, in approaching the municipality, have been fairly met, and have been allowed to make such an increase in the price of the gas as would offset at any rate part of the extraordinarily higher cost of coal. In others, the municipality have held rigidly to the terms of the contract. Such an instance is that of the Bordeaux Gas Company; and as the matters at issue have recently been referred, first, to the District Court (Conseil de Préfecture) and subsequently to the Conseil d'Etat, it is of interest to record the view taken of a question which obviously is of far-reaching importance at the present time. In the Conseil de Préfecture the Company took action to obtain an indemnity from the Municipality either in a lump sum or in the shape of an increased price of gas for all purposes. The action was dismissed with costs by the District Court, following which the Company appealed to the Conseil d'Etat; and it is from the proceedings in this Higher Court, as set forth in the "Mèmoirè" of the Company's Counsel and in reports in "Le Temps" that the present account of an intolerable situation has been prepared.

The Bordeaux Company was established in 1902, with a capital of 8 million francs—since increased on three successive occasions, and now standing at 18 millions. The price of gas was fixed at 8 c. per cubic metre for public lighting and other municipal purposes, at 17 c. for private consumption, and at 16 c. for industrial purposes. But the terms of the concession laid down the principle on which a sliding-scale of charges comes into operation within certain limits, in accordance with variations in the total consumption and in the price of coal. The charges just quoted apply to a consumption of 23 million cubic metres, and to a price of coal of 23 frs. per ton delivered at the gas-works. The terms further specify that, in the event of the consumption of 23 million cubic metres not being reached or exceeded within the third year of the concession, the price of the gas should nevertheless undergo a reduction as follows, as though this total had actually been attained—viz., for each increase of 1 million cubic metres the price should be reduced by one-fifth of one centime; also for each reduction of 1 fr. in the cost of coal, the price of gas should likewise be reduced by one-fifth of one centime. Both of these factors might be operative together; but it was provided that their effect should not reduce prices below 4, 14, and 12 c. for gas employed as already named. This sliding-scale was also operative in the opposite direction (reduced consumption and increased cost of coal), in the same respective proportions up to maxima of 18 c. for private users and 17 c. for industrial use; the price of gas for public lighting, &c., remaining at the figure of 8 c. There were further clauses in the contract enforcing the employment of more economical methods of manufacture, and making the Company share with the consumers the results of such economies.

As regards the position of the Municipality in the contract, M. Boivin-Champeaux, the Counsel for the Company, cited the admission of the Mayor at the time of the concession, to the effect that Bordeaux was the only town in France enjoying such low prices. Moreover, he urged on behalf of the Company that the figures of 23 million cubic metres and 23 frs., taken as bases of the contract, were fixed by the Municipality without sufficient inquiry, and did not represent the conditions at the time. In the first place, the initial consumption was such that the Company would have been justified in raising its prices to 18 c. and 17 c. from the commencement; but on its own initiative the prices were adopted of 17 c. and 16 c., and it was arranged to take as the starting point of the sliding-scale the figure for consumption at the end of the third year. It was further represented by M. Boivin-Champeaux that at the time of the concession the price of English coal, inclusive of all charges, did not exceed 20 frs. The Company naturally bore the effect of this difference; but in comparison with recent months it was not great, since the highest average annual price paid by the concern up to July, 1914, was 26·65 frs. With the outbreak of war, however, the troubles began. In December, 1914, the price had risen to 31·35 frs., advancing further to 35·83 frs. in January, 1915, to 52·61 frs. in February, 57·87 frs. in March, 54·12 frs. in April, 46·58 frs. in May, and 45·41 frs. in June—an average of 48·73 frs. for the half year. This price was bound to be exceeded in the second half of 1915, inasmuch as contracts with English collieries could not be renewed except at prices of 5s. and 7s. more per ton. It was further pointed out by Counsel that the average price of Newcastle coal, *plus* charges for freight, &c., during the first half of 1915 actually averaged 59·64 frs. per ton. It was this figure which the Company were entitled to put forward in accordance with the terms of the contract with the Municipality.

M. Boivin-Champeaux, in addressing the Court on the facts of the case admitted by both parties, dwelt at length on the principle according to which the Conseil d'Etat in many instances had not hesitated to annul or revise contracts—viz., the principle that at the time of the contracts certain conditions of vital effect were not, and could not be, foreseen by the parties to it. He quoted cases of this kind—such as that where an omnibus company holding a concession was awarded an indemnity in respect to the losses resulting from the unanticipated construction of an underground railway. He interpreted this and other judgments as decided by the question: Could the concessionnaire be expected to have foreseen conditions which, so far as he was concerned, completely upset the equitable equilibrium which was the essence of a contract. He instanced the excessive increases in the price of coal as altogether phenomenal—exceeding anything experienced in the Franco-Prussian war, and not coming within the description of "fluctuations" which it was clearly the object of the contract to control as regards the relation of the consumers to the Company. He proceeded to point out the great importance of the gas industry to the country in the present circumstances for the purposes of national defence, and concluded by claiming for the Bordeaux Gas Company the liberty to increase the price of gas per cubic metre by 0·357c. for each franc in excess of the cost per ton of 28 frs. in the case of both public lighting and private use, in addition to the payment by the Municipality of an indemnity of 1,039,000 frs. for the period up to the end of June, 1915, and of 1,700,000 frs. for June to December, 1915.

Counsel proceeded to enumerate the gas companies which have ceased, or are about to cease, their operations—thereby forcing the towns to take over the gas-works, which would result either in a serious deficit in municipal finances or, inevitably, in an increase in the prices of gas. He added, moreover, that close on 300 communes in France have consented by friendly arrangements to increases; and he cited the case in the Paris suburbs of the Syndicated Suburban Communes who, of their own accord, signed a supplementary agreement with the Company for increasing the prices.

Maître Talamon, on the contrary, on behalf of the town of Bordeaux, pleaded that the Company's application should be rejected. He pointed out that a contract may only be modified in the form in which it was concluded. A contract is made in order to do away with the hazards of direct working, and cannot be made afresh whenever it becomes a burden to either of the parties. If the Company, when arranging its contract in 1904, did not make allowance for a war and its consequences, it was to blame; if it could not envisage in advance all that has happened, it could have foreseen the exceptional gravity of the hostilities.

The Government Commissioner (M. Chardenet), however, did not favour the rigid views of the town. He pointed out that it is impossible, if a contract is to be carried out in good faith, not to take into account exceptional facts or circumstauces which could not be foreseen at the time the contract was concluded. Moreover, it is not necessary, in order to take them into account, that the facts should be attributable to the administration; for there is in such a case no question of fault. This has been the jurisprudence consistently followed by the Conseil d'Etat, and applied by it, since time immemorial, to the ordinary contracts for public works. Thus, for example, it has always been admitted that excavations that present exceptional difficulties, which by the most conscientious borings could not have been foreseen, call for the fixing of fresh and exceptional prices.

In the present instance, he continued, it is a matter of a concession, and it is of general interest that the concession of an important public service, such as lighting, should be carried out. The public service must be assured, and as long as the concessionnaire is not guilty of any serious fault, he must carry it on. If, in fact, he ceased working, the public powers would have to assure the service in his place, with the result that the town which had given the concession would have to assume all the risks of the contract. Precisely this eventuality it was desired to avoid, by granting a concession instead of carrying on the service in municipal control. It rests, therefore, with the contracting parties, he maintained, to meet the exceptional and unforeseen difficulties by a provisional and temporary agreement, the object of which would be not to enrich the Company, but to enable it to carry on its public service without the consequences having to be borne by one of the parties alone.

"True," observed the representative of the Public Minister, "the text of the concession settles in definite fashion the obligations of the parties until its expiration. True, the variation in the prices of raw materials from economic circumstances constitutes a risk which may be favourable or unfavourable for the concessionnaire, and it is his risk and peril. But in this case, the rise in the price of coal from circumstances arising out of the present war has attained such proportion that not only it assumes an exceptional character, but it also entails an increase in the cost of manufacture which certainly exceeds the widest calculations

and previsions. In the presence of such a disturbance of the contract, the Company are justified in maintaining that they could not be held responsible for assuring the maintenance of the service simply on the terms originally agreed upon, as long as the present abnormal circumstances continue. Of course," added M. Chardenet, "the Company could not pretend to be exempt from bearing any increase in the cost of coal beyond the figure of 28 frs. per ton, the maximum price to which the eventualities foreseen by article 31 of the contract would correspond. On the other hand, however, it would be excessive to claim that the case is one of an ordinary risk. It is necessary, therefore, according to the Government Commissioner, to find some temporary solution of the question which shall place on the Company during the transitory period the burden of only that share of the consequences which by a reasonable interpretation of the contract can be fairly laid to its charge."

Consequently, his conclusion was that the parties should be referred back to the Conseil de Préfecture in order that—if they cannot come to a friendly agreement as to the special conditions on which the Company could continue its service—the amount of the indemnity should be fixed to which the Company is entitled on account of circumstances outside the contract, in which it has been obliged to carry on the lighting service. Finally, the Government Commissioner stated that he was firmly convinced that this solution would conform to the general principles of justice, to the jurisprudence of the Conseil d'Etat, and to a fair interpretation of the contracts. Accordingly, and above all things, he invited the parties to come to a friendly understanding; since, if these conclusions were adopted by the Conseil d'Etat, it would only be failing such an understanding that the Judge will award the indemnity to which the Company is entitled.

According to "Le Temps" of the 1st inst, the considered decision of the Conseil d'Etat was given the previous day; and it may be summed up as follows:

1. The decree of the Conseil de Préfecture de la Gironde, dated July 30, 1915, is annulled.
2. The Compagnie Générale d'Eclairage de Bordeaux and the Town of Bordeaux are referred back to the Conseil de Préfecture in order that if they do not agree amicably on the special conditions under which the Company is to continue its working, the amount of the indemnity be fixed to which the Company is entitled, in consideration of the circumstances, outside the terms of the contract, under which it has to continue its service under the concession.
3. The Town of Bordeaux is condemned to pay all costs, both of first instance and of appeal.

## HEALTH OF MUNITION WORKERS.

A series of memoranda have been issued by the Health of Munition Workers' Committee, who were appointed to consider and advise on various matters affecting the health and physical efficiency of employees in munition factories and workshops.

### Trinitrotoluol Poisoning.

One of the documents comprised in the series deals with the causes of special industrial diseases and their prevention. Lead occupies the first place of all; afterwards there are some remarks upon trinitrotoluol—the extended use of which "has brought its poisonous properties into prominence." Generally, it seems, the symptoms are at first slight, and, if exposure ceases, quickly disappear. If, however, the exposure is continued, the symptoms tend to become more severe. From unusual drowsiness, frontal headache, eczema, and loss of appetite, the effects may increase until in a few cases profound jaundice (with danger to life) has supervened, and even death has resulted. As trinitrotoluol, like nitro-derivatives of benzene, may be absorbed by the inhalation of vapour or dust, through the skin, and through the digestive tract, at least the following preventive measures should be taken: The production of dust and the escape of fumes into the air of workplaces should be prevented as far as possible; and where dust is unavoidable, workers should wear respirators. Localized exhaust ventilation should be arranged to enable all fumes to be discharged into the outside air without escaping into the workplace. This can be done by enclosing the vessel containing the melted trinitrotoluol in a bell-shaped hood, terminating in an upcast shaft about 20 feet in length, guarded at the top by a cowl. The working opening to the hood should only be of sufficient size to permit necessary manipulations. To protect the skin, overalls and gloves are recommended, with head-coverings for women. In order to prevent absorption through the mouth, suitable provision should be made to permit workers to take their meals in a place apart; and special washing facilities should be provided, which will only be effective if a sufficient supply of clean towels, soap, and nail brushes is always available. Many troublesome cases of eczema have been experienced in new factories; but as soon as suitable lavatories were completed, the trouble ceased. An application found of value to prevent eczema is a mixture of two parts of castor oil to one part of lanoline, to be rubbed into the skin after washing, on leaving work. This mixture, it is recommended, should be placed in the lavatories for general use. The period of exposure of workers should be reduced to a minimum, and should not be prolonged by overtime. Further, periodical medical examination should always be arranged. The memorandum deals similarly with tetryl.

### Lighting and Ventilation.

Memorandum No. 9 issued by the Committee is on the subject of the ventilation and lighting of munition factories and workshops. Referring first to a "stimulating atmosphere," the Committee remark that the ordinary thermometer measures the temperature of the air; and the wet-bulb thermometer determines the humidity, and gives an important measure of the facility with which the body can be cooled by sweating. These instruments, however, give only very imperfect data as to the cooling and skin-stimulating properties of any atmosphere; and it is necessary to have, in addition, some measure of the rate at which a warm body will lose heat. In the observations made for the Committee, the rate of cooling was investigated by means of the Kata thermometer. A large-bulbed spirit thermometer is heated in hot water, and the rate of cooling measured by noting the time which the meniscus takes to drop from 100° to 95° Fahr. while the instrument is suspended in the atmosphere. This gives the dry reading, and shows the rate of cooling due to radiation and convection. To take the wet reading, the bulb is covered with a damp muslin glove, and the operation repeated, giving the rate of cooling when evaporation is added to radiation and convection. The rate of cooling at body temperature is recorded by means of a factor (determined for each Kata thermometer) in mille calories per square centimetre per second. The number of seconds occupied in the fall from 100° to 95° is divided into the factor. The desirable temperature is characterized by being cool rather than hot; dry rather than damp; diverse in its temperature in different parts, and at different times, rather than uniform and monotonous; and moving rather than still.

Means of heating, the Committee say, are usually restricted by practical considerations to some system of steam or hot-water pipes. The ideal form is no doubt by radiant heat; and they have found that rather old-fashioned stoves scattered about a shop may give good results. Gas-heated radiators in which the burned gas escapes into the shop are, in their opinion, "not permissible;" but this is all they say upon the subject. The plan by which warmed air is pumped into the shop tends to create an atmosphere of a highly relaxing and depressing character.

As to lighting, little more is given than a brief reference to the first report of the Departmental Committee on Lighting in Factories and Workshops, which was fully dealt with in the "JOURNAL" at the time of its publication. It is pointed out that the essentials of good lighting are there summarized as adequacy, a reasonable degree of constancy and uniformity of illumination over the necessary area of work, the placing or shading of lamps so that light from them does not fall directly on the eyes of an operator when engaged on his work, or when looking horizontally across the workroom, and the placing of lights so as to avoid the casting of extraneous shadows on the work. The question of artificial lighting is of special importance at the present time, when night work is general, and when women and boys are employed in large numbers. Bad lighting affects output unfavourably, not only by making good and rapid work more difficult, but by causing headaches and other effects of eye strain. The difficulties of supervision, which are always considerable, are further increased if the general lighting of the workshops is insufficient. Attention should be paid to the lighting of the passages and immediate surroundings of the factory, as well as to that of the workshops themselves.

### Industrial Fatigue.

Other memoranda deal with Sunday labour, welfare supervision, hours of work, and the allied subject of industrial fatigue and its causes. In closing what they have to say on the last-named matter, the Committee remark that the "problems of industrial fatigue, already soluble in part by reference to an available body of knowledge well known and used in other countries, have become acute during the great recent development of the munitions industries of Great Britain. It is not too much, perhaps, to hope that the study of industrial fatigue and the science of management based upon it, which is now being forced into notice by immediate need, may leave lasting results to benefit the industries of the country during succeeding years of peace. Our national experience in modern industry is longer than that of any other people. It has shown clearly enough that false ideas of economic gain, blind to physiological law, must lead, as they led in the nineteenth century, to vast national loss and suffering."

### Canteen Equipment.

Dealing with the construction and equipment of industrial canteens, the Committee remark (without giving any reasons for doing so) that, for lighting, "where electricity is available, it is, no doubt, the most satisfactory means of artificial illumination." Otherwise, they say, gas should be used. In the matter of cooking, four methods are considered; and in connection with them, the following statement is made: (1) Electricity as a cooking factor has not hitherto been largely used; but in any case where the power can easily be provided, it is worthy of consideration. (2) Where gas in sufficient quantity is available, gas cooking is usually preferred, on account of cleanliness, efficiency, and saving of labour. (3) Coal is suitable in districts where it is obtainable at cheap prices, or where gas is unobtainable. (4) As the adoption of steam cooking necessitates the installation of an extensive plant, this method need not be considered unless a special supply of steam is available.

# ELECTRICITY SUPPLY MEMORANDA.

Our contemporary, "Electrical Industries," has been discussing the advantages of dual control in the work of electricity undertakings—that is to say, the technical side being left to the engineer-in-chief, and the commercial department to a general manager of first-class commercial experience, and well-grounded in the elements of electrical science. Of course, it is not every undertaking—gas or electricity—that is sufficiently large, or opulent enough, to indulge in such luxurious officering; and all such concerns must continue to put their trust in one man who possesses the combined virtues of being a decent engineer and a first-rate manager with well-developed commercial acuity. Men of this kind are more difficult to get than men with a decided bias in talent one way or the other. Coming to the larger undertakings, then we are agreed that there should be a responsible head of the sales department. There is no certainty, however, whether our contemporary intends that the responsible commercial head should have equality with the engineer-in-chief. Personally, we are not inclined to the view that there should be two executive heads in one undertaking—seeing that this is an arrangement that has been found to breed dissension. In our opinion, there should always be one chief, with responsible thoroughly qualified and conscientious departmental men. There are some excellent examples of general managers, without engineering qualifications, but with, responsible to them, competent engineers and managers of the various departments. But this is an arrangement that can only apply to a very large concern. The happiest plan for works of less magnitude, but still of considerable position, is for the Chief Engineer to be "top dog," with the Sales Department under the charge of a competent Manager. The word "competent" may well be emphasized; for there are men placed in this position who, while they may be good talkers, of unblemished character, and so forth, have no technical knowledge regarding the principles and applications of the goods that are the basis of their commercial work, and moreover have no knowledge whatever of competing goods, their efficiencies, costs, and shortcomings. As "Electrical Industries" remarks: "A man who is unable to appreciate the technical aspects of the business of electricity supply might very well be the reverse of a blessing to any undertaking making use of his services." Electrical undertakings, it is pointed out, which have adopted the policy of appointing a competeut commercial manager have reaped no small benefit from the change. "A case in point is provided by the South Metropolitan Electric Supply Company, which is run in this way, and shows, by its results, the satisfactory working of the technical and commercial alliance at its head. Then there is the County of London Company running on similar lines, and making notable progress. The Westminster Company has, from the first, been controlled by a Commercial Manager, and early in its history paid excellent dividends. The St. James's Company is also under commercial management, and has certainly proved a successful undertaking."

**The Benefit of a Commercial Head.**

**Something That is Essential.**

The gas industry begins to teem with examples of good results from the appointment of a competent chief of the Sales Department responsible to the executive head. The policy is extending; but, as we say, the size of undertakings imposes a limit to its adoption. It has, however, to be recognized by both industries that the times have changed. In the gas industry, the range of gas-consuming appliances has increased enormously—in domestic applications and industrial—and so has the efficiency of the appliances. The same holds good in respect of the electrical industry. There is enough in these conditions alone to compel an intimate knowledge of technical principles and requirements in regard to structure, application, and performance of the goods not only with which the commercial manager has to push forward the business with which he is entrusted, but of those with which he has to compete, so that he may be in a position to be well assured of his ground. With the spreading information among the public of users' actual experiences, it is imperative that the knowledge of a commercial manager of a gas or electricity undertaking shall be on a sound foundation, or he may be tripped up, in unexpected quarters, in a manner which will not add to his dignity, and will certainly prove his inefficiency for the work. In addition to being in a position to assure, under a given set of circumstances, good efficiency for any piece of gas or electricity consuming apparatus, competition demands the fully qualified man at the head of a sales department. It is a good rule always to be equal to, if one cannot be ahead of, a competing undertaking in the matter of executive officers. In fact, this is not only a good rule, but it is a need of the times; for it is prudent to think and act as though one's competitor is a bit better than he really is. A margin of safety in commercial work is as essential as in engineering work.

**Electric Cooking Installation and Ideas.**

"Electrical Industries" has recently described what it calls an "extensive" electric cooking installation that has been put in at the Birmingham offices and works of Simplex Conduits, Limited. It is quite proper that electrical manufacturers should show both faith and patronage in all efforts made to increase the output of electricity; but there is no reason why other people should do so, unless economy of money and time, as well as efficiency in other ways, can be shown. One of the reasons why electrical operation in the kitchen—baking, roasting, boiling, water-heating, &c.—has had such slow growth is because it cannot show either economy or efficiency. This particular installation, it is said, prepares, on an average, 35 dinners and 64 teas per day. The article includes a list of the apparatus installed, with the loadings (here parenthetically stated), and the prices of the goods. The apparatus, it is stated, is found sufficient for all ordinary purposes; but from time to time new types are used for experimental purposes. Lucky electrical kitchen!—"lucky" in not having to entirely rely upon one set of electrical equipment; for experience is not good elsewhere in regard to reliability. The oven (30,000 watts), with two hot-plates (respectively 600 and 800 watts), and grill (2000 watts), is priced at £13; two boilers and steamers (each 1000 watts), £2 15s. the two; one cast-iron boiler (3000 watts) £11 11s; one 5-gallon urn (750 watts), £7 10s.; a frypan (1250 watts), £1 15s.; saucepan (1400 watts), £1 5s.; toaster (600 watts), £1 1s.; kettle (450 watts), 15s.; hot water tank (300 watts), £15. The total cost of this little lot is £54 12s. The cooking space in the oven is 22 in. by 12 in. by 12½ in. The total consumption of electricity averages about 25 units per day; but there is no information as to what work is actually done. For example, it is mentioned, with proper electrical vagueness, that the oven is "in fairly regular use." It is interesting to learn that a representative of Simplex Conduits, Limited, writing to our contemporary, says: "We are now inclined to think that the question of cost is being discussed too much to the exclusion of other advantages, of which we are liable to lose sight." What are these other advantages? Are they first cost, maintenance costs, reliability, time efficiency in any operation (including water boiling), superiority of results at equivalent temperatures, or what? The letter proceeds: "Electric light did not win its battle against gas upon cost." Of course, it did not, and has not. "It won it upon its inherent advantages." We had not heard of this before. But what are the "inherent advantages?" Are they its intrinsic brilliancy and eye-damaging properties, or its "immunity" from fire, or its capacity for not submitting to regulation of light-giving power at each point? However, it is thought "electric cooking will win through in the same way." It is taking a long time about it. The letter proceeds: "Its cleanliness and convenience are so obvious, when once used, that the mere comparison of gas and electricity bills does not quite settle all sides of the question. Now we are all used to our electric kitchen, the gas expert will require to show us some very startling figures before we change our system." Simplex Conduits would be unworthy of place in the electrical industry if they cried "stinking fish." However, it seems that all that the electrical people can show in the way of experience with electric cooking has not done much in popularizing it. In fact, there has been some experience of it which has had exactly the opposite effect.

**Extreme Differential Charges.**

The necessity for increasing the charges for electricity, owing to the high price of coal, has caused people who would not probably have otherwise done so to make inquiry into the tremendous differences that exist in the charges for electricity for various purposes; and they find it difficult to understand why the variations should be so great. They know nothing of load and diversity factors, nor of much else that comes into the arguments, to justify such a difference in charge per unit as (say) 0·33d. or 0·5d. for power and 5d. to the maximum for lighting. It is not surprising that there is dissatisfaction now over the additions to the lighting rates to pay the far heavier bills for coal, labour, rates and taxes, &c., while many power consumers continue to receive energy at the old pre-war rates. This is not so in all cases; but it is so in not a few. It also applies in certain instances not only to power, but to cooking and heating business, to secure which very low rates have been applied, and are being retained. For instance, what justification is there for supplying a heavy short-hour demand for the cooking of luncheons at ½d. per unit, while the same demand spread continuously over more hours for lighting is charged at several times more than ½d. per unit? However, speaking of the ignorance of the public regarding the stock justification arguments for low power rates and for relatively high lighting rates, the "Electrical Review and Western Electrician" [Chicago] says: "Since the supply of power was at first in the nature of a bye-product, it was natural to expect the revenue from lighting to pay the fixed charges of the plant; and the rates per unit of energy were made lower for power applications. This was also necessary to get the business. With the consumption of power in large blocks, however, it is possible to pay all the costs on a low rate, owing to the superior load factor and to the economies resulting from the diversity of different loads." That the lighting consumers have had to pay, and still do so in many places, the whole of the fixed charges, so relieving the power consumers, is well known; and now it is not by any means in all instances where the power business has increased to considerable dimensions that the lighting consumers have reaped any relief through lower charges. Yet there are cases in which the positions of the lighting business and the power business have been reversed—cases in which greater plant capacity is now required for power than for lighting. Notwithstanding, though the lighting now is little more than (to use our Chicago contem-

porary's expression) the "bye-product," the charges made for the current for it are comparatively very high, and still supply the backbone of the revenue. The Chicago paper, however, apparently does not think that the power load can become self-supporting until it reaches a considerable level; for it says: "With the *ultimate* development of the power load, it is probable that the bulk of the revenue will come from this business; and it will necessarily be self-supporting." Certain it is that, under current conditions, there are electric power, heating, and cooking charges in existence that are not paying; and the administrators of the concerns cannot or dare not raise them. The other consumers have to bear the extra burden; or, if they do not do so in the case of municipal undertakings, the general body of the ratepayers are made to suffer the loss. This is still worse, seeing that the ratepayers include many people who prefer agents other than electricity for light, heat, and power.

**A House Divided Against Itself.**

There has been a washing of dirty linen at the County Antrim Assizes. For some time past, the conditions in connection with the Belfast Corporation Electricity Department have not been happy ones. Mr. T. W. Bloxam is the Electrical Engineer; and a Jury has found him guilty of having maliciously used certain words concerning Mr. Alexander Bryce Farrell, whom the Judge described as "a man who evidently thought a good deal of himself." For the wrongful act, Mr. Bloxam has to hand over to Mr. Farrell the sum of £500. Farrell was at one time Resident Superintendent at the Belfast central electricity station. Both parties entered the service of the Corporation in 1900; Mr. Bloxam was appointed Engineer-in-Chief in 1907; and Farrell then came second in command. Until 1914, they seemed to be running together on very good terms. It was on Mr. Bloxam's recommendation that Farrell was appointed Resident Superintendent Engineer; and in 1912, the former wrote a testimonial in favour of the latter when he was applying for the position of Electrical Engineer at Tunbridge Wells. Then an evil day came, which eventuated in the rupture of the friendly relations. An inquiry was instituted into the working of the undertaking in January, 1914. According to a statement by Counsel at the assizes, practically "every man who gave evidence at the inquiry at all reflecting on the management of Mr. Bloxam ceased to be employed in the electricity works within a year from the time of the inquiry." Farrell was the last to go; and his evidence at the inquiry formed a rather grave indictment of the Manager. In June last year, a Joint Sub-Committee recommended that it was no use proceeding with the reorganization of the department unless Mr. Bloxam was asked to resign. The Corporation by one ignored the recommendation. The chain of unhappy incident lengthened. A turbo-dynamo burst on July 15 last; and it was a mercy the whole place was not blown up. About a month later, a serious fire broke out at the station. Mr. Bloxam (so Counsel said) tried to make plaintiff responsible for it; but a Board of Trade inquiry showed that it was due to the spontaneous combustion of coal. The tale passes on to October. A letter was then sent by Mr. Bloxam to Farrell telling him that he had "reluctantly" come to the conclusion that it would be in the interests of the department he should vacate his position; and this was confirmed by the Electricity Committee. About the time that the notice as to dismissal was sent, Mr. Bloxam used words to Mr. John Tyrrell and Mr. James A. Duff, members of the City Council, as to the use of certain material for which he attributed responsibility to Farrell, and the employment of which under the circumstances appears to have meant incompetence. The allegations closed with the words: "Farrell is irreconcilable, is causing disorganization in the station, and is a danger to it, so much so that I would prefer to carry-on the next two months without anyone rather than with Farrell." These are the plain facts of this prolonged trouble. The consequent action for slander was heard before Mr. Justice Pim and a Special Jury. His Lordship ruled that the words were used on a privileged occasion, but he would not rule on the question of malice. The views of the Jury on the point are crystallized in the verdict for £500.

## French Pipe Foundries.

Our contemporary, the "Journal des Usines à Gaz," in its issue for the 20th ult., made reference to the correspondence in the "JOURNAL" earlier in the year on the subject of certain pipe-foundries in France that are under (more or less) German control. The words with which the first letter in our pages concluded were: "All English engineers should be urged to avoid (so-called) French pipes at any cost." While agreeing with what has appeared in the pages of the "JOURNAL," our French contemporary says that our correspondent went a little too far in showing-up as German what he describes as French pipes—remarking: "Fortunately, there are many important pipe-foundries serving the gas industry which are thoroughly and entirely French. There is no need to name them, since they are well known to our readers." An English correspondent who calls attention to this matter has mentioned as one of the most important of these latter works, the Société Anonyme des Hauts-Fourneaux et Fonderies de Pont-à-Mousson.

At Friday's meeting of the Institution of Mechanical Engineers a paper will be read by Mr. Walter Clemence, on "Theory and Practice in the Filtration of Water."

## AN AFTERNOON AT TOTTENHAM.

**London and Southern District Junior Association at the Works of the Tottenham District Light, Heat, and Power Company.**

WITH everything looking its best on a glorious spring afternoon, and a works replete with interest to inspect, those members of the London and Southern District Junior Gas Association who were able to take part in the visit had a thoroughly successful afternoon in every way on Saturday, at the works of the Tottenham District Light, Heat, and Power Company. It was a "war-time attendance," of course, and far different in numbers from what was customary in days of peace. But those who could be present rather gained from this fact, because the small parties allowed everyone to get from the willing guides all information desired on every conceivable point.

Unfortunately, Mr. A. E. Broadberry, the Chief Engineer and General Manager of the Company, was prevented by another engagement from being present to welcome the visitors; but he wrote to the President (Mr. S. B. Chandler), who was also unable to be one of the party, stating that Mr. R. Wardell, the Works Manager, who was in charge of the works, would meet the members, and would, he was sure, make them as welcome as possible, and do all he could to make the visit a success. Mr. Broadberry added that he expected during the afternoon Mr. J. Fisher, the Assistant Engineer, who was responsible for all the extensions, would also be at the works, and would be able to give the members any required information about the proposed new plant. These anticipations were realized; for the members were cordially welcomed by Mr. Wardell on their arrival, and he and Mr. Fisher, with Mr. P. Gardiner, the Chemist, showed them round, and explained everything to them, in a very thorough manner. This was not the first time the Association had been to the works; for they were there something more than six years ago. But six years is a period within which much may happen at Tottenham; and it was found that since the end of 1909 much had happened.

In the tour of inspection, No. 1 retort-house was taken first. In this there are eighteen beds of eights, 22 in. by 16 in. through retorts, with regenerative heating, operated by a Fiddes-Aldridge machine. The coke is removed by a De Brouwer hot-coke conveyor. Built in such a manner as to form part of this house is a setting of four beds of four Woodall-Duckham vertical retorts. This brings the total capacity of the house up to 3 million cubic feet of gas per day. In No. 2 retort-house there are at present 24 beds of tens, 22 in. by 16 in. through Ω retorts, with regenerative heating. There are twelve beds on each side of the house; and the charging and discharging are effected by two sets of De Brouwer projectors and pushers arranged back to back in the centre of the house. Hot-coke conveyors are installed similar to those seen in No. 1 house. The total capacity of the house is 3¾ million cubic feet.

It may be mentioned that the vertical retort gas is washed and measured separately (thus enabling perfect control to be exercised over the plant), and then mixed with the general stream of coal gas at the inlet of the purifiers. Some of the oxide for the purifiers was inspected; and it was pointed out that a half-and-half mixture of bog ore and Westbury oxide is being used, which is found to answer very well. The Williams cyanide extraction process is in operation on the works. Comment was made about the small amount of space in a building which is occupied by three Cutler water-tube condensers capable of dealing with the whole of the coal gas. These are specially fitted with sprays for injecting water-gas tar under high pressure, by means of which the tubes are washed free from naphthalene twice a day.

The coke for the retort-house is elevated to a gas-engine driven screening plant, through which it passes into hoppers. The roof over this plant being in need of renewal, the corrugated iron (leaving something to be desired on the score of durability) is to give place, as an experiment, to sheets of corrugated "Eternit," an asbestos-like material which it is hoped may prove more lasting than its predecessor under the conditions to which it will be subjected. As to the plant, when the coke-hoppers are full, there is provision for loading into trucks which travel on rails to the heap in the yard. For use on the coal, coke, or oxide heaps, there is a Jeffrey waggon and truck loader, similar to that which the members of the Association saw a few weeks ago on the occasion of their visit to the works of the South Suburban Gas Company. A brief description of the machine will be found on p. 585 of the "JOURNAL" for the 14th ult.

There are on the works five sets of water-gas plant—all of the Humphreys and Glasgow type—of a total capacity of 5¾ million cubic feet per day. For more than twenty years plant of this kind has been in operation at the Tottenham works; the first installation having been put down when Beckton was the only other works in England using the system. Those working now, of course, are not the original sets, which were taken out and replaced by larger apparatus some time ago. The process of replacement by plant of larger capacity was subsequently applied to two other sets. The coke is taken by a bucket conveyor to a large overhead bunker, and then is allowed to pass down shoots into the skips on the charging stage, which are wheeled under them for the purpose.

It is impossible within reasonable compass to enumerate all the points of interest about the inspection; but it may be stated that some of the principal ones were in connection with the work

proceeding on the complete new gas-manufacturing section, which, as Mr. Fisher remarked, it is hoped will be really a model section. So satisfied is Mr. Broadberry with the existing settings of the Woodall-Duckham vertical retorts, that there is in course of erection at the present time another installation on the same system, which will carbonize 350 tons of coal per day, and have a manufacturing capacity of about 4½ million cubic feet of gas. This is the scheme for which, Mr. Broadberry mentioned in his letter, Mr. Fisher is responsible. The settings will be provided with outside rotary producers of the Kerpely type. Practically everything will be electrically driven. Current will be generated by two sets of Belliss and Morcom high-speed engines, run condensing, 150 KW. each. The Babcock and Wilcox boilers for the plant are already in position. Exhausters will be installed of the turbo type, driven by Curtis two-stage turbines, run condensing. The latest form of steam condenser—that made by the Rees Roturbo Company—is being arranged for. In connection with this, a water-cooling tower 70 feet in height is being erected. The washers will be of the vertical centrifugal type; and the purifiers are to be constructed of reinforced concrete. The buildings will be steel framed, and faced with Winget concrete blocks. With so much in prospect, it is not surprising that the visitors should have expressed a desire to return to Tottenham when the new section is at work.

The numerous machinery houses were inspected; and the most striking point about one and all was seen to be the care which is bestowed upon everything. Manifestly, here it is the custom to make the best of things. This policy is evidenced, with pleasing results, in various directions. Orderliness everywhere was remarked upon; and yet Mr. Wardell, while going round, told his listeners that they would have seen the works in even better state, but for the prevailing shortage of labour. The true co-partnership spirit must exist at Tottenham; and no doubt the men take earnest heed of the following "constant reminder to co-partners" which is posted about the works: "Saving of time, materials, mistakes, and complaints means money saved; money saved means cheaper gas; cheaper gas means bigger bonuses for the co-partners and larger dividends on their shares." The exhauster-house, valve-house, and governor-house are all handsome buildings, which are well deserving of a word of praise.

At night time, owing to the way in which the district of the Company has developed, together with the arrangement of feeder mains, it is necessary to send the gas out under very considerable pressure through trunk mains to feeding points about 2½ miles distant. The holder pressure is raised to whatever extent may be required by means of high-speed fans driven by De Laval steam turbines. The gas so delivered makes its way back through the supply mains of the district to the gates of the works, at which place a pressure recorder is fixed, with the result that there is both the initial pressure and the realized pressure indicated in the same governor-house.

The inspection concluded—taking the machine shop and sulphate house on the way—with the apparatus that is used in connection with those special processes which have been put into operation to meet the Government requirements in the matter of high explosives. Among other apparatus in this part of the works are both Wilton and Hird-Chambers tar dehydrating plants, which are at present being utilized in connection with the toluol and benzol department.

Betaking themselves to the Recreation Room, the members found, in the substantial tea awaiting them, further evidence of the thorough manner in which things are done at Tottenham. Before rising from the tables,

Mr. F. PEARCE (the Senior Vice-President) said they were much indebted to the Directors of the Company for having kindly thrown open the works to the Association. Mr. A. E. Broadberry had addressed a letter to the President in which he expressed his regret that, owing to an urgent call to London on Institution business, it was impossible for him to be present to welcome the members at the works. He hoped to get back in time for tea; but in this both he and the visitors were disappointed. The letter concluded with the wish that the visit might prove a success. Mr. Pearce remarked that he was sure they all fully appreciated the very cordial welcome that had been extended to them, and the instructive and enjoyable afternoon they had been enabled to spend—largely through the attentions of those who had shown them round. Mr. S. O. Chandler (the President) had asked him to apologize for his absence, which was due to an important engagement.

Mr. F. C. BRIGGS proposed a hearty vote of thanks to the Company for allowing the Association to inspect the works, and for the hospitable welcome accorded them; and with the vote he coupled the names of Mr. Fisher, Mr. Wardell, and Mr. Gardiner. He remarked that the members valued these visits very much; but it was really with some amount of timidity that they took part in them now, for they realized that to do so was asking a great deal of the engineers of the works in the present difficult times. He had been much struck by the excellent order preserved in the Tottenham works. Places that could be made to look attractive, were so made. They would all look forward with a great amount of pleasure to paying another visit when the new section of the works was in running order.

Mr. D. J. WINSLOW, in seconding the vote (which was carried by acclamation), agreed that they were greatly indebted to the Company for an enjoyable afternoon. Tottenham had ever been a progressive Company, and were always finding it necessary to be spending money on new plant. The growth of the business and prosperity of the undertaking had been simply astonishing for a good many years past.

Mr. FISHER said that, in the absence of Mr. Broadberry, he thanked them all for the heartiness with which they had passed the vote. He was very sorry that Mr. Broadberry was not there to say a few words to them. The staff did not at all mind devoting time to showing over the works visitors who understood and appreciated what there was to be seen. In fact, it was really a pleasure to them to do so. He hoped the members had had a good time. It might be pointed out that the capital at Tottenham, though they might spend a good deal of money, was very low. The district had been developing rapidly all along; and, furthermore, they possessed the advantage of a go-ahead Engineer, who was not afraid to tackle new ideas, and of a Chairman (Sir Corbet Woodall) who was himself an eminent engineer, and so was thoroughly able to appreciate the value of improvements. This, he thought, was why it had been the custom to look upon Tottenham as being so progressive a Company. It was hoped that the new plant would form really a model section; and he trusted in time to come the members would see the different apparatus in full working order. He would convey the vote of thanks to Mr. Broadberry and the Directors.

Mr. WARDELL endorsed all that Mr. Fisher had said with regard to the pleasure it had been to show the visitors round, and hoped what they had seen had interested them.

## DEHYDRATION OF COAL TAR.

### A Trouble and the Remedy.

THE question of whether certain constituents of coal tar have an influence on the dehydration of this material is discussed in "Het Gas," by Heer Petit, in an article describing the combating in a coke-oven works of a sort of tar plague.

It is remarked that tar from coke-ovens and vertical retorts, being usually very liquid, no special dehydrating plant is necessary. A few days in a tank generally suffices for the separation of the tar and water by gravity. Until recently, this plan proved quite effective at the Douai coke-oven works. There is a dry hydraulic; but the mains are treated with a constant tar flow. From here and all parts of the works, the tar flows to the general liquor tank, and is afterwards pumped into an overhead tank, where it is allowed to settle. In a day's time, the 20 or 30 per cent. of water is reduced to less than 5 per cent.—the figure generally being 1 or 2 per cent. Suddenly, however, the water content of the tar after a day in the tank was found to be 32 per cent.; and after another day had passed, it was still 30 per cent. The introduction of a steam-coil into the tank was of hardly any use, as some days later the amount had only fallen to 28 per cent. Finally, the storage tanks were filled, and it became necessary to dispose of the tar at considerably reduced prices.

For two days the trouble ceased; and then it returned with full intensity. But this time there was some clue furnished by the fact that during this period the saturated tar-oil from the benzene works had been pumped into the liquor tank; and the question arose whether this tar-oil might not be the cause. In order to arrive at the truth, a portion of dehydrated tar from the normal period was divided into two parts—one part being mixed with 20 per cent. of water, the other with 20 per cent. of water and 10 per cent. of tar oil. After shaking the bottles thoroughly, the contents were allowed to settle for 24 hours in a warm place. It was then seen that the tar mixed only with water had completely separated, the amount of water in it being 2 per cent.; while the oiled tar, on the contrary, still contained 17 per cent. of water. It was thus obvious that the trouble had been caused by the presence of tar oil in the tar. After the bad tar had been got rid of, and the tanks had been cleaned out, the trouble completely ceased.

It is certainly very peculiar that such a thing as tar oil, being a normal constituent of coal tar, with very low viscosity, should have such an effect on the properties of tar when added to this liquid. But the fact is of interest to gas-works using tar oil, anthracene-oil, &c., for the washing-out of naphthalene, and afterwards pumping the saturated oil to the general liquor tank. The author advises that it should be stored separately, and delivered from a special tank directly into a tank-car.

### Society of British Gas Industries.

It having come to the knowledge of the Society that a circular has been sent out with an extract from the "Sydney Morning Herald" of Nov. 26, 1915, the Secretary asks us to state that this did not emanate from the Society; and they disclaim any responsibility for it.

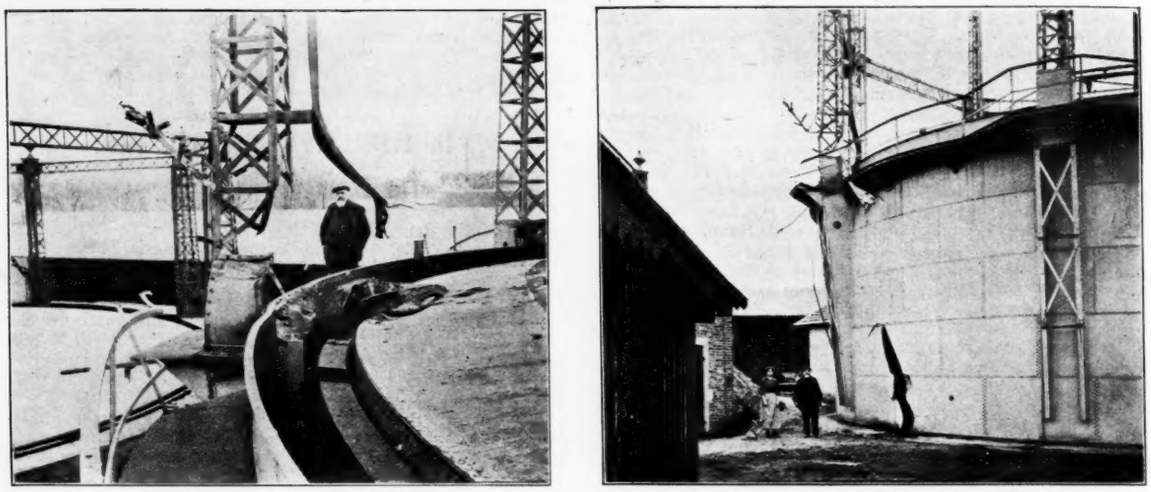
### Problems of Interest to the Lighting Industry.

It is announced that, with a view to considering the organization of research on problems of interest to the lighting industry, a Committee of the Illuminating Engineering Society has been formed, and will issue a report on the subject for consideration at the annual meeting on Tuesday, May 9, after the conclusion of formal business. Meantime, members are invited to send in any suggestions for research which might profitably be supervised or undertaken by members of the Society.

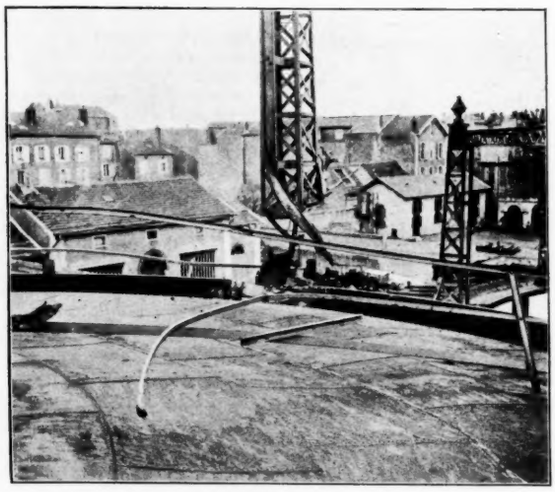
Among wills proved last week was that of Sir Hugh Owen, G.C.B., one of the Court of Directors of the Gaslight and Coke Company, and Chairman of the Hornsey Gas Company. He left property valued at £36,613 gross. The will has been proved of Mr. John W. Docwra, a Director of the West Surrey and Herne Bay Water-Works Companies, who left property valued at £133,745 gross.

# GAS-WORKS DAMAGED BY ARTILLERY.

Some idea of the sort of damage which gas-works are liable to suffer when exposed to the effects of modern artillery fire will be gathered from the photographs now reproduced. They show different views of the works under war conditions in the French frontier region near Nancy, of the Société du Gaz de Pont-à-Mousson—a town, of some 14,000 inhabitants, in the Department of Meurthe et Moselle.



**The 3000 and 2000 Cubic Metre Holders as Shell Damaged.**



**This Holder of 3000 Cubic Metres Capacity (already out of action) was struck by the Second Shell.**

**The Manager's House Struck by the First Shell.**

**The Outlet Governor Wrecked by the Third Shell.**

# INFORMAL MEETING OF SCOTTISH GAS MANAGERS.

**Annual Gathering in Glasgow.**

The Thirty-Third Annual Meeting of Scottish Gas Managers was held in the Grand Hotel, Glasgow, last Wednesday. At the outset,

Mr. J. W. NAPIER (Alloa), the Convener, said that the meeting on this occasion, having regard to the environment of war, might have been thought out of place were it not for the very important position the gas industry took in relation to providing munitions of war. It would be found in years to come that the industry had added to itself an additional laurel. In manufactures, as well as in domestic requirements, the province of the gas engineer would have increased importance. If they put into the industry a larger amount of scientific knowledge, they would have done their duty. He called upon Mr. Mackay (Motherwell) to deliver his Presidential Address.

## PRESIDENT'S ADDRESS.

Mr. A. MACKAY then proceeded to read a lengthy address, some extracts from which it is proposed to give.

After acknowledging the honour done him by his selection for the position of Chairman of the 1916 meeting, Mr. Mackay dealt with the "Industry's Work in War Time," and the prospects that managers would have to face on the "demobilization of the army of armament makers." The following sections of the address will be of general interest.

### COAL.

During the past winter, in the gas industry and throughout all industrial circles, the difficulties experienced in obtaining adequate coal supplies have caused very serious inconvenience and a considerable amount of anxiety. These difficulties were to some extent anticipated by the Government, if one has to judge from the flow of legislation which was turned on during the past year. Looking back on what has taken place, perhaps the most drastic step of all was the restricting of our exports—a measure introduced in May last. This order affected neutral countries, and was subjected to much criticism in trade circles; but, on the whole, it was admitted to be a step in the right direction. It may be that its real object was not grasped at the time—some being of the opinion that British coal had been finding its way to our enemies, while others held the view that the order was the outcome of a desire on the part of the Government to keep a controlling finger on the exports, lest an exceptionally heavy demand from abroad should adversely affect home manufacturers. I am of opinion that both reasons bulked very largely in the minds of the Government; but perhaps the latter view has turned out to be the more accurate one. It is now known that the Government have the interest of the home consumer well in mind; and this is more forcibly brought home by an extension of the restrictions which came into force in August last, prohibiting the export, except under licence, of coal and coke to all destinations other than British possessions and protectorates. The official explanation was that the Government thought it necessary to bring in legislation in order to regulate coal prices for the home consumer by having an absolute control of the trade, so as to maintain the proper proportion between home and foreign consumption.

Coming to the home trade department, the outstanding feature of the year of interest to our industry is undoubtedly the passing of the Price of Coal (Limitation) Act. This legislation, complicated in many parts, was highly necessary in the interests of the gas industry and manufacturers generally, of whom so much is expected in times such as we are passing through. It appears, however, to have its anomalies. Granted that there was a danger, notwithstanding exports being controlled, of prices to the home consumer mounting to a high, and perhaps an unheard-of, level, it is argued that, by fixing the increase of price at 4s., the interests of the coalowners have to a certain extent been lost sight of by the Government in their very natural anxiety to provide for home industries. The coalmaster asks what of pitwood and other essentials rising in price, with no guarantee that the State is going to step in and help either by fixing a maximum price for pit props or by restricting the wages of his men. It is also obvious that collieries which have a large export trade are much better placed than their less fortunate neighbours who cater solely for the home trade; and it remains to be seen whether, after (say) a year's working under the Act, some provision will not be made for those collieries which, for geographical or other reasons, have no export market, and in whose case special circumstances have arisen rendering an extension of the statutory 4s. necessary in order to ensure a continuance of work.

Any attempt on my part to forecast the market at a time like this would simply be inviting trouble. A twelvemonth ago, we must remember there was no sign of Government intervention. In trade circles no such step was thought likely to be taken in regard to our exports; the general feeling being that, as our export of manufactured goods had fallen so low, the export of coal would be encouraged rather than interfered with, and it was only the Government's action in restricting the shipment of coal and coke—first of all to neutral markets, and subsequently to the markets of our Allies as well—that kept the prices at a reasonable level. What further restrictions will be imposed, it is impossible to tell; but it is well known that home consumers have had reason to complain of their supplies of fuel, and the Coal Exports Committee some time ago met a deputation of coalowners from Scotland and elsewhere for the purpose of talking matters over. So far as can be gathered, the Scotch coalowners have decided to take no risks, and are understood to be delivering increased quantities of coal to local users. The price for home consumption being restricted, collieries will naturally expect much higher prices for the supplies which are available for export; and for a time at least very high prices are likely to rule.

There is no falling off in the demand from abroad—the foreign markets almost without exception being eager buyers; and this will no doubt also have a hardening effect on prices. There is little hope of the French and Belgian coalfields affording much relief to the Allies in the immediate future, and Germany's coal exporting activities are not likely to be fully resumed for a while; so that Great Britain will again have to act as the provider of a very considerable proportion of the European requirements of coal and coke. In the circumstances, therefore, there is every prospect of a spell of very brisk business for the collieries, and, as a natural result, for gas undertakings' primary residual.

The conclusion of peace during the course of the ensuing year is by no means a remote possibility; but even such a contingency, greatly as it will be welcomed, would not, in my opinion, have more than a temporarily disturbing effect on the coal trade or prices of this country, upon which so many nations have to depend.

### COKE.

The great advantage that our industry possesses with the very high prices ruling for its most important raw material, is that the increases necessary to compensate to some extent for the extra outlays do not require to be entirely imposed upon the gas consumer. From the fact of coal being high in price, and coal supplies being held-up as a natural consequence, the market value of coke increases. During the past year prices ruling for coke have considerably outstretched anything the industry has experienced for years. In admitting that prices have been higher than in pre-war times, it is not my intention that you infer from this remark that the prices were not justified, or that the industry was willing to make hay while the sun shone, or, to put it more correctly, to take advantage of the dark war clouds hovering over our country. The cost of our coal supplies has been 6s. to 9s. per ton higher, the earnings of workmen have been enormously increased, and the price paid for money on loan will be very much higher. It is not in my mind to suggest that my colleagues meet troubles half way. But I would suggest that, in the sale of this important residual under the present high prices ruling, we should be careful not to exact the last shilling per ton under the customers' existing strain, but rather grasp the opportunity we so much desired when our stocks in Scotland caused us practically to beg of our ordinary consumers to take coke out of our yards almost at any price, and set our brain agoing to devise other means of disposal; and where we have had consumers who perhaps never used coke as a fuel, let us do all in our power to retain their custom.

Coke is now employed in a number of works under boilers for steam production, for road engines, and for domestic use; and forced draught has been introduced for the purpose of enabling small coke and breeze being used, and with very satisfactory results. But let us thankfully remember that we are not always to be at war, and that the prices of coal will ease-off slightly and the supplies become more plentiful, and let it be our present aim towards our coke consumers: "If we please, you tell your friends; if we do not please, you tell us." With this satisfaction, combined with the general efficiency in the results from their use of coke, we will obviate, if not entirely abolish, the carrying of exorbitant stocks, and consequently maintain a fairly good price.

### SULPHATE OF AMMONIA.

If 1914 was a year of fluctuation, 1915 will be notable in the annals of the industry as a year of almost uninterrupted market advance. In the closing months of 1914 British supremacy on the high seas had been practically established, and the danger of interruption of trade routes had disappeared. It had also become clear that any falling-off in the consumption of certain countries would be more than compensated by increases elsewhere. Confidence, therefore, had already returned to the market; and if during the year there have been periods when the advance has marked time, this has been chiefly due to difficulties concerned with the question of shipping. Increased quantities are at present required at home, both for agricultural purposes and the manufacture of munitions; but manufacturers were somewhat staggered when, about the end of January, it was decided, on the recommendation of the Fertilizers' Committee, with the approval of the Presidents of the Board of Agriculture and Fisheries and the Board of Trade, to suspend for the present the issue of licences for the export of sulphate of ammonia.

Following this, the Sulphate of Ammonia Association addressed a letter to producers giving information as to the Association's negotiations with the Board of Agriculture previous to this body

recommending the suspension of licences, in which they state that they realized three months ago that the present difficulty was likely to arise. They then approached the Government and asked them to take steps to obtain information relative to the production and probable consumption of this article in the spring, together with returns from export merchants showing what quantities had already been sold to foreign countries. The object was to enable the Government to make as accurate a forecast as possible of requirements and supplies, and thus determine in advance what quantity would be available for export each month. The idea was that export licences should then be granted at the beginning of each month for the estimated surplus, and that further licences should be issued towards the end of the month if the surplus turned out to be greater than was anticipated. It will be readily admitted that this was an admirable arrangement, which would have enabled both consumer and manufacturer to have got along without the trouble that has been experienced—more particularly by the latter—the home demand proving quite insufficient to keep the works clear. That these difficulties, which were sometimes acute, did not more greatly disturb the market must be attributed to the conviction that, despite all appearances to the contrary, the Government could not wish otherwise than well to such an important branch of the national export trade.

The Sulphate of Ammonia Association have to be congratulated upon the efforts made to urge manufacturers at this opportune time to put their house in order with a view to the production of sulphate wanted abroad—*i.e.*, the 25 per cent. quality, containing not more than 3 per cent. of moisture, and ¼ per cent. of free acid. Germans have for some time set their minds on securing the foreign markets supplied from the British Isles; and we must admit that, up to the time of the outbreak of hostilities, their efforts were crowned with some appreciable success. They prepared the sulphate in such a way as would be most acceptable to the customer, and what was of still more importance they sold it at a cheaper rate. The German sulphate of ammonia market abroad is at present interrupted on account of the war complications, and British sulphate is no doubt finding its way into markets previously supplied from Germany. And who is better able to judge as to quality than the customer who has used both? Now is our opportunity. If the material we are at present supplying to pre-war German customers is satisfactory, we will no doubt to a large extent retain that business; while on the other hand if our sulphate is not equal to the test demanded, the result is too obvious to require remark.

### MOTHERWELL GAS AFFAIRS.

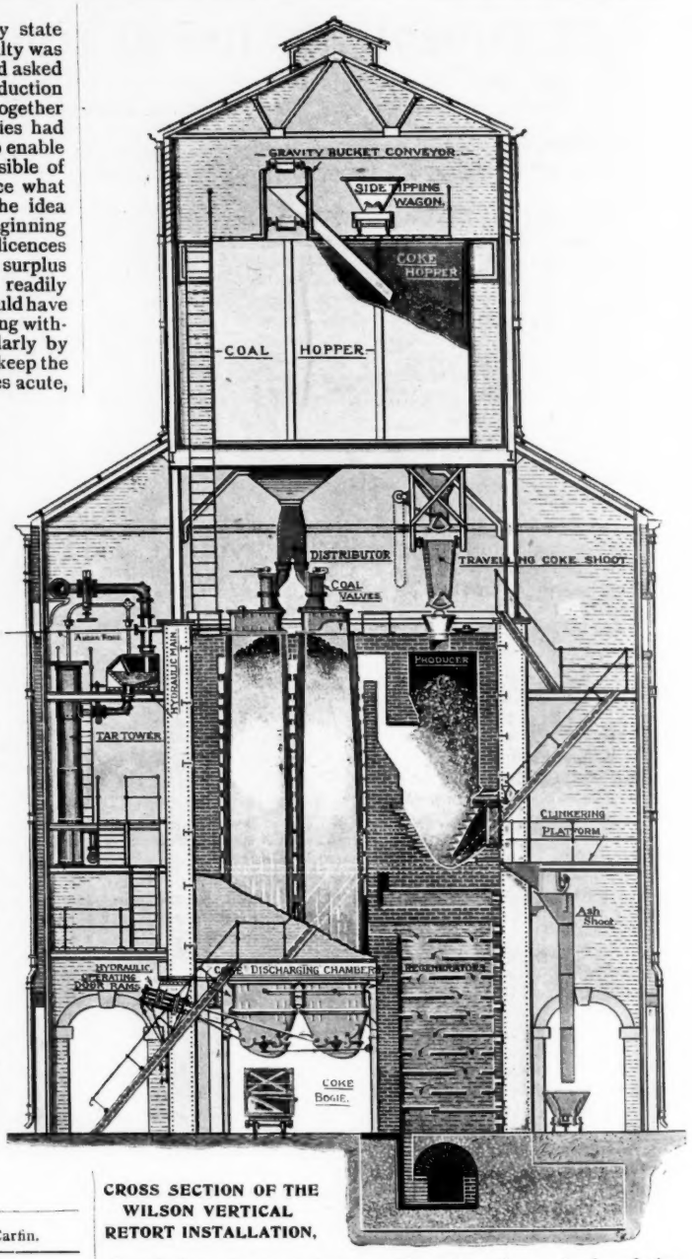
Mr. Mackay then indulged in a "Three Years' Retrospect"—his experiences since his appointment to the management of the Motherwell Gas-Works, and the arbitration for the purchase of the undertaking by the Town Council under the Lanarkshire Gas Order, 1914; as also the works of the Carfin District Gas Company. The following table of the results of the purchases was appended to the address:

*Motherwell and Carfin Gas Arbitration.*

| — | Motherwell. | Carfin. |
|---|---|---|
| Capital | £56,307 | £12,350 |
| Capital per million cubic feet sold | £485 8 1 | £1,029 3 4 |
| Sale of gas | 116 millions | 12 millions |
| Award | £135,987 9 8 | £23,755 0 0 |
| Award per million cubic feet sold | £1,172 6 1 | £1,979 11 8 |
| Award per share of Company | 48s. 3d. | 38s. 5d. |
| Expenses of award | £2,058 16 1 | £1,104 18 9 |
| Expenses per million sold | £17 14 11 | £92 1 7 |

Mr. Mackay then gave a history of the Motherwell gas undertaking since its formation in 1849. After tracing the progress made in the decennial periods 1871 to 1911, and subsequently year by year, he pointed out that the Town Council, immediately on acquiring the undertaking, asked that a report be furnished as to the advisability of proceeding with the large extensions necessary on the present works site as compared with the erection of entirely new works on another site, with suitable railway facilities. On account of the trouble encountered by underground workings, a suitably safe and convenient site could not be obtained, with the result that the Council decided to proceed with the necessary extensions on the existing works site. Through the foresight of the late Company's Directors, the works were left with ample vacant ground for extension purposes; and the only question which caused the Corporation to suggest the transferring of the works was the fact that up till then they had been carried on without having a railway siding into the premises. This obvious necessity now having been arranged, procedure on the old site was determined upon.

By means of plans and photographs taken during the progress of the works, Mr. Mackay detailed his procedure for preparing the site and arranging the underground workings and foundations. Reinforced concrete was largely made use of—in fact, on the main foundation for the vertical retorts, including the chimney shaft, the bases for the stanchions of the outer walls, and the




**CROSS SECTION OF THE WILSON VERTICAL RETORT INSTALLATION.**

foundation of the coal-store adjacent to the main foundation, 895 tons of cement were used, and more than 10 tons of steel. In the foundation and walls of the filler and hoist pit, 157 tons of cement and 3¾ tons of steel were used. In the foundation, wall, and sloping side for the belt-race 321 tons of cement and about 7½ tons of steel were used. The total quantity of cement used was 1373 tons; of steel, 21 tons 8 cwt.—the total weight being 1394 tons 8 cwt.

A subsequent section of the address is of much interest—that in which Mr. Mackay gives his reasons for the

### SELECTION OF VERTICAL RETORT PLANT.

As in all the details of the extensions, the selecting of carbonizing plant most suitable to the requirements of our district received careful consideration. Owing to epoch-making changes and developments, there were many points which had to be taken into special consideration in selecting a system of carbonization; and the difficulty in arriving at a conclusion has never been greater than at the present day. The difficulty is not, perhaps, that there are several good systems to choose from, but rather that rapid developments may prove that what appears a good selection to-day will be superseded in a very short time. Yet it is hard to imagine—despite the progress of the age and the improvements and advances made during the last few years—that in the future it can be more difficult. Since labour charges can now be reduced so very low, it would appear that further advances must be in the direction of improved carbonizing results.

Local circumstances must, of course, be the leading consideration to guide in the choice; and there is only one point about this argument which is general to all gas undertakings—the necessity to manufacture the product at the lowest possible cost, and with the greatest efficiency. Local conditions may be stated to cover chiefly the cost and conditions of labour, the class of coal to be

carbonized, the quality of coke required for local consumption, and the illuminating and calorific power of the gas to be supplied. Everywhere, of course, the labour question is a highly important one, though it must not be thought that wages and capital cost are out of proportion, or, in other words, that the high labour charges make it more profitable to adopt the greatest labour-saving appliances. The quality and characteristics of the coal available for carbonization in the locality are probably the predominating factors. Our local coal is perhaps as rich a gas-making coal as can be found in the country, giving a good make of gas of high illuminating and calorific value and good coke. When, however, there is a local demand for coke for trade and manufacturing purposes, a large and fairly hard coke is certainly desirable.

This being the case, care must be taken that a new system of carbonization will neither make the coke too hard and dense nor too soft and spongy. There is the fear that, with the new carbonization systems, where the coal is at rest for a longer time than is the case with the other systems, certain coal may produce a coke so dense and hard as to be unsuitable for what household business exists in the district.

Having regard to local conditions, the points which must, therefore, be taken into close review in considering a new system are—results, fuel account, conditions of working, area occupied by the settings, wear and tear, labour charges, and capital cost.

### RESULTS.

The results obtained in all the systems of vertical retorts are superior to those resulting from carbonization of the same coal in horizontals, even with full charges. The large makes of gas per ton are of the greatest advantage; at the same time the calorific value and candle power of the gas are well maintained. I abstain from quoting particular figures in regard to this item in my experience, because of the different classes of coal carbonized at various places. I may, however, record the average make from a vertical installation to be 11,000 cubic feet per ton of coal with the gross calorific value of about 570 B.Th.U. and a well-maintained candle power.

### QUALITY OF COKE.

In carbonization developments, the question of the quality of coke produced in various systems is one which has come very much to the front, and has been seriously considered. As suggested, the question of the quality of coke produced is mainly a matter of local conditions—regard being had generally to what the local market requires, and has been accustomed to. Therefore, in the selection of verticals, this point must be carefully borne in mind.

### FLUID RESIDUALS.

In regard to the yield of tar and ammoniacal liquor, all the evidence gathered respecting the vertical systems indicated that the yield of both had increased, and the former improved in quality. Generally the yield of ammonia appears to have increased about 20 per cent. But I am especially impressed with the fact that, from most results obtainable, a notable increase in the yield of tar and ammonia compared with horizontals has been experienced; while the quality of the tar has generally improved. Two additional advantages claimed for the vertical retort system are the absence of naphthalene in the gas produced, and the reduction of sulphur compounds. I consider these points have been firmly established by results obtained. I hold a strong opinion that the gas supply to-day should be of constant quality, and as pure as possible; and in my view the vertical retort offers to the industry the best form of carbonization yet known, and one by which our highest ideals can be realized.

### CAPITAL COST.

The question of capital cost is naturally one of great importance. This expenditure, however, is attended with so many advantages that, by the introduction of a vertical installation, a total yearly saving in our case of £3531, as per the annexed table of details, would accrue, representing 17·65 per cent. on the capital outlays. It thus appears to be a fair conclusion that verticals justify themselves upon financial grounds. The table was prepared when we started the extension scheme, fully a year ago; so it will be obvious that, with the increased cost of labour, the figures would be more favourable to-day.

Mr. Mackay then introduced some comparative figures of various systems of retort-setting, which he considered justified him in recommending his Council to adopt the Wilson "continuous-intermittent" system; and they were erecting an installation consisting of six ovens, containing six retorts each, or thirty-six retorts in all. Each retort can carbonize 3 tons of coal per twenty-four hours; the plant being capable of manufacturing 1¼ million cubic feet of gas per twenty-four hours. The coal will be conveyed from the coal-receiving hopper in the coal-store (sunk flush with the ground level), at the bottom of which is a two-roll coal-breaker provided with screen and bye-pass shoot to allow the smaller coal to escape. The coal will then pass to an automatic filler arranged to fill the conveyor buckets. It will then ascend, pass overhead, and be dumped into any section of the coal-bunkers. The coal will be fed to the retorts from overhead bunkers of forty-eight hours capacity. The plant will be provided with a hoist for use in the event of a breakdown in any of the plant.

### SUBJECTS FOR DISCUSSION.

Mr. Mackay suggested as subjects for discussion during the afternoon: (1) Pitch for Gas Making; (2) Nitre Cake as a Substitute for Sulphuric Acid. On these subjects, he merely remarked: With the scarcity of coal and the difficulty in receiving adequate supplies, some engineers have been prompted to experiment in the use of pitch, as an auxiliary to coal, in gas making; and as our coal supplies are not likely to improve, I am of opinion that every effort should be made to bring this process to practical satisfaction. Again, when considering the multitudinous difficulties in carrying on our undertakings, we cannot look on that of inadequate supplies of sulphuric acid as the least, and a suitable partial substitute, even accompanied by inconveniences and reduced results, would be welcome as compared with the running of the ammoniacal liquor to waste. The matter of price, and the

*Comparative Statement of Vertical and Horizontal Retort Installation on a Make of 250 Millions per Annum.*

| VERTICALS. | £ s. d. | £ s. d. | HORIZONTALS. | £ s. d. | £ s. d. |
|---|---|---|---|---|---|
| Coal used to produce 11,000 cubic feet per ton = 22,727 tons, at 12s. 6d. delivered | | 14,204 7 6 | Coal used to produce 9650 cubic feet per ton = 25,906 tons at 12s. 6d. delivered | | 16,191 5 0 |
| Carbonizing costs, at 9d. per ton | | 852 5 3 | Carbonizing costs, at 2s. 9d. per ton | | 3,562 1 6 |
| Purifying account, at ¼d. per 1000 | | 260 8 4 | Purifying account, at ¼d. per 1000 | | 260 8 4 |
| Cartage to works, 22,727 tons at 7d. | | 662 17 5 | Cartage to works, 25,906 tons at 7d. | | 755 11 10 |
| | | 15,979 18 6 | | | 20,769 6 8 |
| Repairs on retorts at 0·33d. per 1000 (being half of horizontals). | | 343 15 0 | Repairs on retorts, 0·66d. per 1000 cubic feet | | 687 10 0 |
| | | 16,323 13 6 | | | 21,456 16 8 |
| *Less* coke at 14 cwt. per ton, 15,908 tons— | | | *Less* coke at 14 cwt. per ton, 18,134 tons— | | |
| Used for heating retorts, 12 per cent., 1909 tons | | | Used for heating retorts, 25 per cent., 4534 tons | | |
| Breeze, 10 per cent., 1590 tons, at 4s. | 318 0 0 | | Breeze, 10 per cent., 1814 tons, at 4s. | 362 16 0 | |
| Coke, riddled, 78 per cent., 12,409 tons, at 8s. | 4,963 12 0 | | Coke, riddled, 65 per cent., 11,786 tons, at 8s. | 4,714 8 0 | |
| | 5,281 12 0 | | | 5,077 4 0 | |
| Tar, 12 gallons per ton, 272,724 gallons, at 2d. | 2,272 14 0 | | Tar, 11 gallons per ton, 284,966 gallons, at 2d. | 2,374 14 4 | |
| Sulphate of ammonia, 30 lbs. per ton, 304·38 tons, at £9 10s. (net) | 2,891 12 2 | 10,445 18 2 | Sulphate of ammonia, 30 lbs. per ton, 347 tons, at £9 10s. (net) | 3,296 10 0 | 10,748 8 4 |
| | | £5,877 15 4 | | | £10,708 8 4 |

| | |
|---|---|
| Horizontals | £10,708 0 0 |
| Verticals | 5,877 0 0 |
| Balance in favour of verticals | £4,831 0 0 |
| Interest and sinking fund on £20,000 at 6½ per cent. | 1,300 0 0 |
| | £3,531 0 0 = 17·65 per cent. on |

cost after meeting interest and sinking fund charges in addition to ¼d. per 1000 cubic feet of lessened repairs on retort-bench—representing £260 8s. 4d. per annum on a make of 250 millions.

nitric acid content, if the question as to whether the sulphate produced would be suitable for our consumers' purposes, are all difficulties to be faced in the utilizing of what is practically a waste product from the manufacture of sulphuric and nitric acids.

The address concluded with some feeling references to recent losses sustained by the Scottish gas industry by the deaths of Mr. Adam Macpherson, Mr. Joseph Hepworth, and Lieut.-Col. O'Connor—Mr. Mackay remarking: To the bereaved widows and relatives of our departed colleagues and friends need I say the sincere sympathy of all Scottish gas managers is extended.

## DISCUSSION.

In inviting discussion on the address,

Mr. NAPIER said that certain of the points raised were open to serious difference of opinion. It was interesting to observe that with a population of 40,000 the manufacture of gas in Motherwell was only equal to 140 millions; while in other towns of smaller population the output of gas was somewhat more. It was evident that in Motherwell there was a field for progress, especially when they remembered that it was in the midst of such great industries. Reference had been made to the cost of arbitration in the case of Motherwell and Carfin; but while the prices paid for the two undertakings, on the basis of per million cubic feet of gas manufactured, were largely different, one must consider the circumstances of the two places. In the case of Carfin, the area was largely progressive, and in the case of Motherwell it was also largely progressive; but it would appear that if one were to go into the evidence of the two cases the circumstances would quite admit of a proper explanation being made. In regard to the use of nitre cake instead of sulphuric acid, he had great difficulty in hoping for the successful use of this material. The matter of competition must make them conscious of the importance of the quality of their products. The figures given by Mr. Mackay in his statement of the production of gas from the vertical retorts must be taken with very great care. One must have regard to the quality of the coal. In his own case, he had had no difficulty in making 13,000 cubic feet of gas per ton, as compared with 10,000 cubic feet previously; and the yield of tar was up from 9½ gallons to 15½ gallons. There were several features of the vertical retorts worthy of note. Labour presented no difficulties. As regarded manipulation, he was not sure that one form presented advantages so much greater than the other. At the same time, he believed that the potentialities of vertical retorts were not yet exhausted. He considered that constructional engineering had probably done its best to give to the gas industry the absolute economies of labour; and it rested with the chemist to improve the products not only in quality, but in quantity.

Mr. A. MASTERTON (Edinburgh) said the matters raised by the Chairman were of paramount importance to the gas industry. All engineers and manufacturers had suffered in connection with labour, and had had a great deal of anxious work. In his own instance, they had had two applications for increases of wages during the last twelve months, and in each instance a war bonus was granted. These concessions had amounted to some £8000 for the year, equal to about 1d. per 1000 cubic feet of gas sold. In addition, there was some dissatisfaction among a certain section of the employees, and it became necessary to apply to the Board of Trade for assistance. The matter was referred to arbitration, and the arbitrators decided that the men were well recompensed for the work they performed. Seeing that they were carrying out urgent Government work, they had received intimation from the Ministry of Munitions that their works were classified as a certified establishment under the Defence of the Realm Act. This would help them in connection with labour troubles. As for coal troubles, they had given them more concern and inconvenience than anything else. Recently they tested the market, and in response they only received offers for about one-fifth of the quantity that they had had offered in previous years. They were only able to cover their requirements for six months. But, as they were aware, the question of coal supplies had been referred by the Board of Trade to a District Committee, whose offices he believed were in Glasgow. They had submitted their case to this Committee, putting it forth quite clearly; and they awaited the decision. The question of coke was among the points raised by Mr. Mackay. They had endeavoured to fix their price for coke for the home consumer in direct accordance with the price that they had to pay at a given moment for their coal. Again, when they dealt with consumers beyond their own area of supply, they increased the price. Local customers they charged 17s. 6d. a ton. For customers beyond the limit of supply they charged 28s. at the works. Nor did they let the foreigner off. They charged him about 25s. a ton. He did not think this was too much. They knew about sulphate of ammonia—the agreement with the Board of Agriculture and Fisheries. He thought it was fair so far as price was concerned —£16 per ton for the merchant and 10s. higher for the farmers. The problem of the carbonization of pitch had come prominently before them on account of coal difficulties. They had been experimenting at Granton, with results as follows: The quantity of gas per ton was a little less with coal taken out of stock; but the illuminating power was improved. The percentage of carbonic acid was slightly more, and the total coke was slightly decreased, although there was an increase with screen, with a consequent reduction in the amount of breeze. There was an augmentation of tar, with an almost corresponding drop in the quantity of liquor. They were making preparations to have the test taken on a large scale. The proportion they were using was 5 per cent. of pitch to 95 per cent. of coal. They obtained the best results with this proportion, using coals stored a considerable time.

Mr. ALEXANDER YUILL (Dundee) said, in dealing with the question of the coal supply, one was met with difficulties right through. Mr. Masterton had mentioned the Coal Supply Committee. He hoped it might be a benefit to them; but he had his doubts. He did not think the Committee considered the coke supply. There was one difficulty, though he did not say so in any spirit of carping criticism, and that lay in the constitution of the Committee. It would have been better for the country if the Board of Trade had co-opted some members other than coal masters. They had, for instance, Glasgow, with a consumption of almost a million tons per annum. Surely Glasgow and other large public utility services should have an interest. Their advice would have been of much benefit. The Chairman had given them a great number of figures in connection with his works, and he thought there was no man in the room who took a more personal interest in the position at Motherwell than he did. There was one point, and he referred to it to encourage the Chairman in the resources at his command. When he left Motherwell, the population was 10,000, with a make of about 20 million cubic feet. If one took Motherwell's position with the works represented by their worthy Convener, and took the population and make of gas in the two towns, they would find that there was much room for development in the consumption of gas in Motherwell.

Mr. ALEX. WILSON (Glasgow), dealing with the subject of labour, remarked that they had all been put to sore straits during the last winter; and if the war continued they would be much worse in the coming winter. They in Glasgow looked forward to using female labour to a larger extent. During the past winter they had from 50 to 60 women meter inspectors and a large number of women clerks; and they were beginning to use women in the works themselves. They were proposing to obtain some of them trained to machine work and retort charging. This was looking far ahead; but they were better to be prepared. No doubt, as usual, they would get through with what they had to do. So far as they had employed female labour, up to now they were finding it very satisfactory. The coal question was bristling with difficulties. The Price of Coal (Limitation) Act, on account of its vagueness and uncertainty—and one might add a few other reasons—had not been at all satisfactory. It had, of course, modified the rise in prices that might otherwise have taken place. Instead of 4s. a ton, they might have had 20s. put on. But if they could not get their coal, they would have to get assistance from the Board of Trade to force supplies to customers who were supplied before. Public utility companies should have supplies. The Coke and Coal District Committee were doing good work. So far as they had powers, they were doing something effective; but they had no powers whatever to compel contractors to fulfil their contracts. He could inform Mr. Yuill that the Committee had been appointed to deal with both coke and coal. There would be a great shortage of coke this season; and the Government were looking forward to maintaining supplies of coke for munitions works. The Government had asked them to restrict the supplies of coke to consumers who could use coal or anthracite for their purposes, and so retain the coke for munition works. He had raised the question of competing firms dealing with coke. He brought the matter before the Munitions Department, pointing out that they ought to be represented on the Committee. He had thought all the time that gas undertakings and steel-works should be represented on the Committee as well as coal masters. More attention would yet have to be given to this matter, so that all the interests could be attended to. He did not know whether they would have to approach the Institution of Gas Engineers so as to get this put forward. The matter had been communicated to London. With regard to sulphate of ammonia, they all, of course, wanted to get as much as possible. They had not grumbled at whathad been done to compel them to supply the farmers; but the holding-up of licences, now that the farmers had obtained their supplies, was certainly wrong. At one of their Glasgow works they were now within two days of being filled-up with stocks of sulphate. If licences were not to be issued, it would mean that they would lose the season. He believed that there were at least a million tons of sulphate which could be shipped, and sent abroad, when the local farmers were not going to use it. He believed the Fertilizer Committee would take the matter up and grant sufficient licences to clear out the stock not required for home demands. As for the carbonization of pitch, he did not think that in usual times they would be inclined to consider it. At the present time, however, the Government were anxious that every gas manager should consider the proposal. All the tar distillers had immense stocks of pitch. They also had large stores of tar; but they were unable to work it up on account of their stock of pitch. If they could help them, he would not advise anybody, from the experiments he had made, to use more than 3 per cent. of pitch. If they started with 2½ to 3 per cent. of pitch, they would get better results. If they each used about 3 per cent. on their make, they would practically take the whole make of pitch off the market, and so would relieve the situation very much. They would also help the future situation, because if the stocks of pitch continued rising, the price would not improve for many a long day; while if they used the pitch, it would make the matter better by and by. In connection with toluol, practically all the gas-works in Scotland had done really good work in its production; and the Government were aware of it, and were grateful

for it. He had been asked to say, on behalf of the Government, that if they could improve their plant in any way to increase the production of toluol, they might kindly do so. They wanted every gallon that could be had. A little attention might increase the production. Those who could wash their gas with oil, and have extra plant (where this could be had), might also consider this. Several people were doing it, and the results were good. Home-made plant could often be used with good results.

Mr. NAPIER said they had with them that day Captain Hilton, of Birmingham, one who, by reason of the position he occupied in that city, and by reason of his connection with the Munitions Department, would be able to let them hear some details that would prove helpful in increasing the quantity of toluol.

Captain HILTON said the subject was a very large one. The work he was called away from his battalion to attend to was the putting-up of plants that washed the gas with creosote oil, which Mr. Wilson had asked them to consider. In washing with creosote oil, they used anything from 40 to 70 gallons per ton of coal carbonized. This was practically the same practice that obtained in coke-ovens, where one obtained from 70 to 80 or 90 gallons per ton of coal carbonized. With 70 gallons they found they could extract 80 or even 90 per cent. of the benzol or toluol contained in the gas. Results varied enormously. Scotch coals containing a larger amount of paraffin than those of the Midlands, they would not give the same results. They obtained as much as 4 gallons of crude per ton of coal carbonized, or 3 gallons rectified. They set out on the toluol plants with the idea that they were going to get ¼ gallon per ton of coal; and this was obtained. But, since the plants were started again, the demand for benzol, and especially from the French Government, became so very great that it was a question how far they could put the toluol plant to recover benzol in addition. They had sufficient margin in the plant to enable them to get from 80 to 90 per cent. of the benzol as well as the toluol contained in the gas. The plants were on the large side; and the margin had come in particularly useful to-day.

Mr. SAMUEL MILNE (Aberdeen) wished enlightenment on one point referred to by Mr. Masterton. They had experienced the loss of their men, who were tempted away to positions where remuneration was greater. Mr. Masterton had said his works had become a certified establishment. What did this mean? He took it that it did not mean a controlled works. They were all certified occupations and exempted trades, if they liked; and they all had reason to believe that they came under the Munitions Act. If this was the case, and a man was taken away from their employ to another firm, they could take measures against the man finding occupation for six weeks. He would like to know if the position of Mr. Masterton was different from that of anyone else. Did his Corporation take steps to have him put in this position, or were they all in the same position?

Mr. MASTERTON: As I understand it, this certification, so far as we are concerned, prevents strikes. That is the principal point. Also, a man cannot leave our employment without a certificate; or, rather, if he does leave our employment without a certificate, he cannot get employment in any other works for a space of six weeks. These are the chief points in connection with the situation. It is not a controlled establishment. We are a certified establishment; that is all. We would have preferred to get the control; but the Government authorities could not see their way to go this length.

Mr. MILNE: Has Mr. Masterton taken steps to have himself put in that position, or are we all in the same position?

Mr. MASTERTON: I think we are all in the same position.

Mr. WILSON: You have to make special application to get your works certified under the Munitions Act. We made application to the Munitions Department, and received a certificate for all our works. The difference between certification and control is that in the former instance your finances are not controlled. In the controlled works the Government take control of all the finances, and take care that too much profit is not made, or, if profit is made, that they will "collar" a percentage of it. As Mr. Masterton says, the effect of having the works certified is that the men are not allowed to strike. They have to have their disputes settled by arbitration. Since we have been under the Act, it has settled the men a good deal. Special application has to be made. I think most of the tribunals, if you were making toluol, would class you as a munitions works.

Mr. MILNE: I still think that if we are engaged in the production of toluol and benzol, and supplying gas for munition purposes, we automatically come under the Act, whether we apply for a certificate or not.

Mr. P. B. WATSON (Cambuslang): The terms are that, if the Minister of Munitions so decides, the works shall be declared a controlled establishment.

Mr. MASTERTON: They don't want to interfere with our finance arrangements.

Mr. J. BALLANTYNE (Hamilton) was of opinion that they were not going to have a great deal of assistance from the Coke and Coal Committee. He was not sure the Government were not more to blame in the matter of their difficulties than anyone else. There was no restriction in the coal supply to munition works, and the coalmasters charged what they chose. He was informed—though he was not in a position to prove it—that 25s. a ton had been paid for coal going to munition works. How would the coalmasters be inclined to supply coal to public utility establishments at 18s. a ton when the Government had paid that amount? Was it any wonder, if this were the case, that they had difficulty in obtaining supplies for their works? If it were true, it was putting them in a very invidious position, because they could not expect to obtain supplies through the Committee—they could not expect that the coalmasters, if they could get a bigger price, were going to supply them. The coalmasters could not help themselves. They were compelled to send coal where they were ordered to send it. In regard to sulphate of ammonia, he had no difficulty in getting all his sulphate disposed of. He could have sold double the quantity quite easily.

Mr. DAVID FULTON (Helensburgh) criticized the comparison in the address between horizontal and vertical retorts. In the comparison, Mr. Mackay had adopted a practice very common, but wrong. He compared his brand new verticals with the old horizontals, thus obtaining unfair results. One could get from horizontals almost an equal make to what one got from verticals. He was, however, a believer in verticals. Their advantages were so great in the way of saving labour. They required no fictitious bolstering-up to prove their superiority. With regard to the use of pitch, the financial aspect must be considered as well as the patriotic. When one was asked to pay £1 a ton, it was difficult to consider it at all. It did not seem to him that the Price of Coal (Limitation) Act made any exceptions. The price of coal was fixed at the pit head.

Mr. MACKAY, in reply, said Mr. Napier was especially interested in the figures concerning arbitration. He hoped that Mr. Napier did not think he was making any criticism as to what had been done. It seemed to him that his Corporation had been unfortunate in taking over these works at this time. It was demonstrated very forcibly that the debt per 1000 cubic feet of gas sold was equal to 23s. 8·86d. in Motherwell and to 29s. in Carfin; while the Glasgow figure was 3s. 10·87d. In some adjacent works the figure was 7s.; so they could say it was going to be a hard struggle for the Motherwell workers to pull through with gas at ordinary selling prices. They were quite aware that the output of gas was half what it should be; but from the plant they were erecting they were arranging to supply more gas to the community. He was pleased to see that in Glasgow they were introducing female labour. During last year he had two women meter inspectors doing quite splendid work. Since the New Year he had female labour in the works; and the women could use a shovel perhaps better than some of the men. He was very much interested in Mr. Milne's desire to extract information regarding controlled works. In his town, where there were so many steel-works, and wages were very high, it was difficult for him to keep the labour he had at present. A few weeks before March 2 eight of his men gave notice. Five of them received telegrams from Ireland that their mothers were seriously ill! He communicated the trouble he had to the Ministry of Munitions; but it was no use. Mr. Wilson had mentioned that in controlled establishments the men could not strike. But what of the men on the Clyde who struck? They were under control. Government control was practically of no use to anyone.

### NEXT YEAR'S PRESIDENT.

Mr. NAPIER, in thanking the President for his address, said that his last duty was to propose a name for the presidentship. He proposed Mr. Charles Fairweather, of Kilmarnock; and he also wished the compliment of the position to be associated with Mr. Fairweather's father, for whom they all had the very highest respect.

Mr. LAURENCE HISLOP (Uddingston) seconded; and the proposal was adopted.

### THE ANNUAL DINNER.

The meeting was followed by the annual dinner, at which Mr. Masterton proposed the toast of "The Imperial Forces," to which Colonel Peebles, 7th Royal Scots (who is home from Gallipoli), responded.

## Using Coke, Lignite, and Gas for Firing Boilers.

According to the "Journal of the Society of Chemical Industry," the "Zeitschrift für Angewandte Chemie" has pointed out that, in consequence of the scarcity of coal in Germany, several of the electric power generating stations have made experiments with other fuels; and the results obtained have been published in a report to the German Home Office. It is stated that there is not much likelihood of utilizing coke in large quantities. It is not suitable for use with mechanical stokers, owing to the lack of volatile constituents requisite for igniting the fuel; but it can be burnt on ordinary grates with hand stoking. The coke should be in small pieces, of high porosity, low mechanical strength, and low content of ash and water. When mixed with coal, the best results are given by a mixture of 20 per cent. of porous gas coke and 80 per cent. of highly bituminous coal. Lignite cannot be employed on an ordinary hand-stoked grate; but lignite briquettes can be used in place of coal without any considerable alteration of the grate or fire-arch. Small briquettes are preferable. A mixture of lignite briquettes and coke can be used on mechanical stokers if the layer of fuel be not too deep; but it is not to be recommended for fixed grates, because frequent poking is necessary, and the briquettes are thereby disintegrated.

At a meeting of the Junior Institution of Engineers to be held on the 18th inst., Mr. R. Rankin, B.Sc., M.Inst.E.E., will read a paper entitled "Speeding-Up in an Engineering Factory."

## COAL AND COKE HANDLING MACHINERY.

### Discussion on Mr. Lister's Paper.

The following remarks were made in the course of the discussion on the paper read by Mr. J. E. Lister at the meeting of the Society of Engineers on Monday of last week, on "Modern Coal and Coke Handling Machinery as Used in the Manufacture of Gas." An abstract of the paper referred to appeared in last Tuesday's issue [p. 30].

The PRESIDENT (Mr. Percy Griffith), in proposing a vote of thanks to the author—which was heartily accorded—said the paper was a good example of present-day methods in the organization of gas work with a view to economy. If they were to maintain their position in competition with other countries, and in the case of individual works if favourable results were to be obtained compared with other works, it was necessary to consider most carefully the question of economy in working.

Mr. P. E. MACDONALD (in a written communication) remarked that, while the "D.B." charging machine had several very attractive features, it appeared to be one which would give a gas manufacturer some concern—especially in times like these, when the question of obtaining coal of any description was a difficult problem, and to maintain a constant supply of a uniform class of coal must make the problem a much more difficult one. The author said the groove in the guide-pulley was made 3½ to 4½ inches deep according to the class of coal, which suggested that the same class of coal must be used. Again, the speed of charging varied with the class of coal, and also with the weight of charge. These variations of speed appeared to be left to the attendant. If so, it must be a very objectionable feature; and it would be almost impossible to obtain anything like uniform charges. It appeared also that, in addition to the coal being of one class, to obtain successful working it was necessary to have it free from moisture; and when working direct from railway waggons or barges, it would often be difficult to avoid having a good percentage of moisture in the coal. Unless these difficulties could be overcome, the advantage of having only one machine for a 20-foot through retort was very doubtful. The Arrol-Foulis charging-machines could be adjusted to any desired weight of charge, and would continue to give a uniform and level charge until re-adjusted, without having to depend on the attendant. The "D.B." pusher had too many working parts which had to enter the heated retort, and consequently would require a lot of upkeep. The Hunter-Barnett or "Co-Partner" pusher had the advantage of simplicity; and, when operated by hydraulic power, the water inside the rams had a cooling effect on them. Even where the "D.B." chargers were giving satisfaction, the Hunter-Barnett pusher could be used to advantage in conjunction with them. Objection might, of course, be taken to having the two powers in one works; but it should be remembered that, though electricity had many advantages, particularly in high-speed work, there were many operations in large plants which could be much better handled by hydraulic power. Take, for example, waggon-tipping. He had two tippers; and they had for several years required no attention, except an occasional rub of grease on the rams. They also had the advantage of being fool proof. In most large structural works, electric, hydraulic, and pneumatic power were working side by side; and he knew of no manager who would care to part with any of the three. Could Mr. Lister give some information as to the comparative cost of upkeep of the different conveyors, and also up to what temperature it would be advisable to use the band type. One of the most important points to study in designing machinery for coal and coke handling—and particularly the latter—was the reduction of working parts, and especially pins and rollers.

Mr. G. M. GILL said one point which had not been mentioned, and which was rather overlooked in a great many gas-works, was the position of the breaker. He had had experience for some years at a works were the breakers were placed on the hoppers. As the coal was brought in by ship, cranes unloaded it on to the breakers, so that the breaking was done once and for all as the coal came into the works. Mr. Lister also did not mention anything about automatic weighing machines for coal. They were not generally used on gas-works; but they were almost bound to come into general use. He had had experience of plant where all the coal, as it came into the works, passed through an automatic weighing machine; and it worked most satisfactorily. There was only one point in the paper he would like to criticize, and this was the one raised by Mr. Macdonald as to the advantage of hydraulic plant over electric. There really was something in this. The hydraulic charging machine, in his opinion, undoubtedly put in a better charge than the electrical machine; and most gas engineers had come to the conclusion that a full charge, or as heavy a charge as could be got into the retort, was advisable. In his experience, the hydraulic machine put in a fuller charge than the electrical one. At the same time, there was the disadvantage with hydraulic power that it was necessary to have two machines to do the work which one electric machine could do.

Mr. A. C. M'MINN said the author seemed to think that the tray conveyor was disadvantageous as regarded cost. Personally, he had had a good deal of experience with tray and chain conveyors, but had found that, though the tray conveyor had to be watched more carefully in order to obtain the best results, nevertheless when the total cost was worked out, there was not very much in favour of the chain conveyor in the matter of wear and tear.

Mr. G. F. ZIMMER said reference was made to push-bar and push-plate conveyors; but he was not sure what was the difference between the two.

Mr. D. C. CROSS remarked that most of his experience was with the vertical type. In this case, he agreed that one of the best conveyors for handling coal was the gravity bucket. He also agreed that hydraulic tippers were the simplest, as there was no cost of upkeep. He had had these tippers in use for twelve years, and all the upkeep required was to rub grease on once a week.

Mr. M'MINN, referring to the bar pusher, asked whether Mr. Lister's experience was that the round bar or the flat bar gave the greater breakage of coke.

Mr. LISTER, in reply, said he would be the last to recommend electricity or any other mechanical power for tippers, and work of that sort, if hydraulic power was already installed. But in many cases there was no hydraulic power available; and in these circumstances it was preferable to put in a mechanical arrangement which could be driven off the engine that had to be put in to drive the coal plant, rather than go to the expense of a pump and (generally) an accumulator. He had not advocated one type of machine more than another. He agreed that the upkeep of hydraulic plant was comparatively inexpensive; but the upkeep of the mechanical plant he referred to should be no more expensive. The hydraulic ram for discharging a retort was also very simple, and worked extremely well; and if hydraulic power was available, apart from the mess that water generally made in the retort-house, there was not very much objection to it. As to the "D. B." charger, there really was no necessity at all for the coal to be uniform in size. Provided it was broken-down to a convenient size—anything under 2 inches cube—the projector type of machine would deal with it comfortably, whether it was dust or lumps. The ideal class of coal was bean size, which charged-in extremely well. Dust required a higher velocity, while lumps required less velocity; but after the first charge or two had been put in, the operator could tell what was the best speed, because it was not from hour to hour that the class of coal varied in gas-works, but from consignment to consignment. Generally the operator had a mark on his machine, to show what notch to put the speed-regulator at; and if he ran at this speed for any class of coal, under ordinary circumstances there was very little difference in the results, unless there should be a wide variation in the quality of the coal. It was not necessary for the coal to be free from moisture. In fact, he knew places where it was purposely wetted before it was put in the retort, and there really was not any trouble at all. It reduced the dust. This was one advantage of having coal slightly wet. Automatic weighing machines were extremely useful, and were being installed in a number of cases. His experience with tray conveyors had been mainly with coke-oven plants; and they certainly had got a very bad reputation. As to the breakage of coke with conveyors, it was the general experience that the round bar caused over-breakage, and it had now practically been discarded. The flat bar was much more efficient than the round bar. The difference between the push-bar and the push-plate was not very great. The push-bar conveyor was practically the same type as the hot-coke conveyor, only the bar was about 6 inches deep, and fitted into the trough in the same way as the scraper or push-plate conveyor. The strands of chain were formed in the same way as the coke-conveyor chain stampings, and were not carried on rollers. The push-plate conveyor chain consisted of wrought-iron or steel plates bolted to a cross spindle; but in the push-bar conveyor the cross bar was generally of steel casting. He agreed that the gravity bucket conveyor was really the best arrangement to have for a vertical installation. At the same time, in many installations—he did not know if it was owing to liability to breakdown—a hoist was erected in addition, as a stand-by, and also for elevating coke. Though the coke could frequently be elevated by the gravity bucket conveyor as well as the coal, many engineers seemed to prefer to dump the coke into the bogies and run it up in the hoist.

## Standard Calorific Power of Gas in Switzerland.

We have received from the Swiss Association of Gas and Water Engineers a copy of a recommendation adopted by the Association with reference to the calorific power of gas supplied to consumers from all Swiss gas-works situated at altitudes of less than 800 metres [2625 feet]. The recommendation is as follows: The calorific power of the gas as it leaves the works should not be less than 4300 calories per cubic metre, measured moist at 15° C., and the average barometric pressure of the works. [If 760 mm. is taken for the average barometric pressure, this calorific value is equivalent to 483 B.Th.U. per cubic foot at 60° Fahr., 30 inches, and saturated.] The calorific power referred to is the lower or net calorific power—*i.e.*, the gross calorific power after the heat of evaporation of the water produced by combustion has been deducted. The net calorific power has been chosen because it is the more easily determined with the calorimeters in common use. The temperature of the gas and the barometric pressure should, however, be observed at every determination of calorific power; and by the use of these observations there should be calculated the calorific power of the gas when measured dry at 0° C. and 760 mm. It is recommended that gas be distributed of as uniform calorific power as possible—*i.e.*, it should not vary by more than 200 to 300 calories [22½ to 33¾ B.Th.U. per cubic foot].

# SCOTTISH JUNIOR GAS ASSOCIATION.

## (WESTERN DISTRICT.)

The Annual General Meeting of the Scottish Junior Gas Association (Western District) was held in the Royal Technical College, Glasgow, on the 1st inst.—Mr. DAVID FULTON (the retiring President) in the chair. The principal feature of the meeting was the final sessional lecture delivered by Professor Arthur Smithells, F.R.S., of Leeds University.

### NOTES ON PURIFICATION.

Mr. FULTON intimated that, with regard to the postponed discussion on the paper, "Notes on Purification," read by Mr. Wm. Bennett on Feb. 19 [see "JOURNAL" Feb. 22, p. 419], the author thought that if any member had anything to say on the paper he should put it in writing and send it to him (Mr. Bennett). He would reply; and the views expressed would be included in the "Transactions" of the Association.

### ANNUAL STATEMENT.

The HON. SECRETARY and TREASURER (Mr. M. Littlejohn), in his annual statement, said that the session had been a fairly successful one, and had fully warranted the decision of the Council to carry on. The total income up to date was £55 8s. 10d.; the total expenditure, £40 15s. 7d.—leaving a balance of £14 13s. 3d. There were a few outstanding debts to pay; but the net balance in hand would be over £10.

The CHAIRMAN, commenting on the financial position of the Association, said that they began the session with a credit balance of £8 and an amount against them of £24. They had turned this into a credit balance of something slightly over £11. While they had an account for the "Transactions" to meet, the Association was solvent, and had money in hand to meet odd debts. They were indebted to those corporations who during the session had given them the opportunity of seeing three installations of vertical retorts. The session was fortunate which produced such papers as those by Mr. Dickson, of Kirkintilloch, and Mr. Bennett, of Greenock. He agreed with the member who said that Mr. Bennett's paper was worthy of inclusion in a student's library. So far as could be learned, the Roll of Honour indicated that 34 members had joined His Majesty's Forces. Three of them had died for their country. As that day marked the conclusion of his presidential term, he would like to say how much he had enjoyed occupying the position. The Council had worked with a single mind, and that for the benefit of the Association; while the Secretary had had a strenuous time and had worked admirably. Mr. G. T. Purves, of Auchengeich, Chryston, the Vice-President, now automatically became President for the next session. He invited nominations for the Vice-Presidentship, and for the vacancies in Council.

### VICE-PRESIDENT AND MEMBERS OF COUNCIL.

Nominations were then made; and at the close of the meeting it was intimated that the voting had resulted in the election of Mr. A. Wright (Lockerbie) to be Vice-President. The retiring members of Council were re-elected *en bloc;* and Mr. Bennett, of Greenock, was elected for the place vacated by Mr. Wright.

Mr. FULTON said that some reference had been made to the formation of a library for the Association's benefit. By arrangement with the Trustees of the late Mr. Scrivener, they had secured the bound volumes of the "JOURNAL" from 1899 to 1915, the "Transactions" of the Association of Gas Managers from 1865 to 1880, and the Gas Engineers "Transactions" from the date of its institution to 1915. The funds of the Association were not sufficient to defray the cost of securing these books; but the Council felt sure the members would not require to be told how very valuable these volumes would be to them. It was therefore their intention to ask from the members a subscription to defray the cost. They would be circularized in due course. They had arranged with the Technical College authorities to house the library for them; and members would have direct access to the books.

### JOINING-UP WITH THE ENGLISH ASSOCIATIONS.

Mr. JOHN WILSON (Falkirk) proposed joining-up with the English Associations. Though the matter could not be dealt with this year, it was the proper time to bring it up for the consideration of the Council. The English Associations had a Joint Council; and all matters of moment were dealt with by the Council. He thought it would be to their advantage to join-up with them. The English Associations printed joint "Transactions;" and they could have their "Transactions" embodied in them with great saving.

Mr. JAMES M'GHIE expressed great sympathy with Mr. Wilson's idea, and suggested that the Eastern District should be asked to act with them.

Mr. FULTON said the matter could be safely left with the Council.

### INTRODUCTION OF PROFESSOR SMITHELLS.

Mr. FULTON, in introducing Professor Smithells, said he wished publicly to acknowledge that it was largely due to the efforts of their last session's lecturer that they had so distinguished a lecturer that day. Although not a Scotsman, Professor Smithells started his teaching career as an assistant to Lord Kelvin in Glasgow University. So he thought they could take a little proprietary interest in him. The professor would deal with the bunsen burner, with which he had intimate connections, and on which he was specially qualified to speak, as he was a pupil of Bunsen. It was interesting to note that, contemporary with Professor Smithells in the great master's laboratory, was another scientist to whom the gas profession was for ever indebted, Welsbach. It was Sir Henry E. Roscoe who brought clumsy, early attempts at the atmospheric burner to Bunsen's notice, and Professor Smithells, before being appointed to Leeds, was assistant to Roscoe. So that, through their lecturer, they were doubly brought into touch with the genesis of the bunsen burner. Professor Smithells' own chief research had been made on flames, and he, more than anyone else, exploded the heresy, probably originating with Faraday, about the preferential combustion of hydrogen in hydrocarbon flames. He also established the proof of what goes on at the surface of the inner cone of the bunsen flame. To Professor Smithells was really due the credit of the inception of the Gas Department at Leeds University.

### THE LECTURE.

Professor SMITHELLS delighted the Association with a series of practical demonstrations of the phenomena of flame, using various types and experimental adaptations of atmospheric burners. His experiments, in which several gases were used, included the separation of the cones compressed in a single bunsen flame; and he showed how the separation was conducive to drawing off the gas in the individual cones for the purpose of analysis. The separation was secured by surmounting a bunsen burner with a glass tube containing another shorter tube of smaller diameter, and adjusting the rate of gaseous inflammation to the gaseous flow. In the course of his lecture, which was a concurrent explanation of the experiments, the Professor said that he would not attempt for a moment to repudiate the association which the President had tried to establish between his past and the City of Glasgow; but there was one small inaccuracy in the biography which Mr. Fulton had given. He was associated with Lord Kelvin; but, as he was then only 15, it was in the capacity of a junior student, and not of an assistant teacher. His first chemical laboratory was on that very site, when Sir Edward Thorpe was there and Sir William Ramsay was his assistant. The last time he saw his revered teacher, Sir Henry Roscoe, was last September, only a month or two before he died. He asked if he could tell him any particulars of interest about the beginning of the bunsen burner. He told him a story; but it was practically the same as that included in his memorial address when Bunsen died. The Professor threw a picture of the head of Bunsen on the screen, saying that there was a German with a beneficent nature who might even have been taken for an Englishman. He was one of the most charming men he had ever known in his life. When he was with Bunsen, he (Professor Smithells) was in a sort of ecstatic state. Bunsen was a wonderful man—a man of self-effacement, the very antithesis of what one would now understand from the word Hun. It was pleasant to think there was once a German nation, and perhaps there might be again.

In referring to the adaptations of the atmospheric burner, the Professor recalled the late Thomas Fletcher, whom he defined as a man of great ability with a natural genius, a man who rendered memorable services to the gas industry. There was, however, no great progress until the Welsbach light, which led to a large number of developments, some fruitful and some unfruitful. The beginning of his own preoccupation with flame was a very simple experiment. This the Professor carried out before his audience, extending a bunsen burner by means of a glass tube, and by using a simple gas, carbon monoxide, revealed the nature of its flame structure. He repeated the experiment with the composite flame of cyanogen. In using coal gas for the same purpose, he referred to the problem of the interconal gases, whose poisonous odour was often so evident when something went wrong with a burner. It was once thought that the evil smell of a badly-burning gas appliance was due to acetylene. The smell attributed to acetylene was, however, really the smell of phosphoretted hydrogen; pure acetylene being odourless. One would like to know what caused the abominable smell in a badly-burning atmospheric burner. The real reason lay in carbon monoxide—one of the most noxious of gases.

The development of the bunsen burner in recent times had been a development in consequence of the Welsbach light and the gas-fire. The designing of the bunsen burner was a question of great interest. The mechanical question was bound up with the new science of hydrodynamics. But when one came to apply the theories of fluid motion to coal gas, one had a most difficult problem—indeed, the application of the principle was almost impossible. There was no sound theory statable in the mechanics of the bunsen burner. He believed it was a fact that it was all a question of trial and error. A lot of pretences had been made. There had been a great variety of names; some had lived and some had died. Certain things were, of course, established. The makers of gas apparatus had done wonders in manufacturing appliances for the house simple and manageable. Some of the progress made was due to the introduction in the works of men of real scientific training. The application of science was a vital matter. In saying this, he was, naturally, only crying his own wares. But he had been crying his own wares with a very good conscience for a long time. The circumstances of the times had justified what had been done. Compared with other industries, the gas industry stood in a most favourable and promising position. He thought they were now having a lesson through the war in the application of science which they would never forget. When they talked of

applying science to industry, it was not the science one could skim off as one skimmed cream off milk. A besetting sin in this country was the attempt to go at the thing in a rush. Men would be sent to them by people who thought they could get enough for their purpose in a few months with attendances only two or three times each week. One could not get what was necessary this way. The only thing that would profit them in their work of production or distribution was a liberal investment in science.

VOTE OF THANKS.

Mr. PURVES, the new President, in moving a vote of thanks to Professor Smithells, said they were very fortunate in having such a distinguished lecturer to address them.

Mr. ALEXANDER WILSON (Glasgow) thought the kernel of the whole matter came out in Professor Smithells' concluding remarks, when he emphasized what might be done in taking up the scientific side of their work. Unless a man specialized to a certain extent, he never got very far. At Leeds University, as they knew, they had a scholarship in connection with gas; and the wonder was that it was not more taken advantage of. If they could only get a large set of men going through, it would do the industry a world of good. After the war perhaps they would see things in a better light than they did to-day. Their adversaries at the present time specialized more than the English did.

Professor SMITHELLS, in reply, said he was deeply sensible of the compliment paid him, and it had a special value through being associated with Mr. Wilson, to whom so much was owing for his devoted and disinterested labours. He had been a true friend to them and to the whole industry.

## THE IMPORTANT PART PLAYED BY GAS AT LAST YEAR'S PANAMA-PACIFIC EXPOSITION.

As one of the agents that helped towards the great success of the Panama-Pacific Exposition held last year in San Francisco, credit is given to gas by Mr. E. B. PRICE, whose account of the services it rendered appears in the last issue of the "American Gas Institute News."

The author says: Never before in the history of expositions has gas been such an important factor as it was in contributing to the success of the Panama-Pacific International Exposition. Not only was gas used for lighting, but to gas also fell the duty of driving the chill from the great buildings at night, and feeding the millions of visitors in the cafés and various booths of the exposition. In the State and Foreign Section and along the Avenue of Progress, Avenue of Palms, Administration Avenue, and the Zone, gas was used for street lighting; and at midnight all electric lighting was turned off and gas was used entirely for patrol lighting on the exposition grounds.

On the Zone, the adaptability of gas to ornamental lighting schemes was amply demonstrated. There were 72 posts installed, 75 feet apart; each post being 39 feet in height and surmounted by a conventional sea-lion. From the arms were suspended two five-mantle, low-pressure lamps, giving 900-candle power each.

The distribution of gas throughout the Zone was high pressure, so that a regulator was placed at the base of each post; and there was also installed a ¾-inch bye-pass cock. This, in connection with the mercury-valve distance-lighting equipment, made it possible to turn on and off the lamps at the base of the post. In addition to this, at all the exits and entrances of the exposition grounds low-pressure gas-lamps were installed and burned nightly; and at two of the entrances and all the exits gas arcs were used exclusively.

In the State and Foreign Section, high-pressure lamps were installed, one on each post, on 2½-lb. pressure—two mantles to the lamp, and giving 1100-candle power. In the Court of Abundance serpent-headed urns were supplied by high-pressure gas through ½-inch pipes; and the weird effect of these altars will long be remembered by visitors to this beautiful court.

Practically all the buildings on the grounds were piped for gas; and modern lamps were installed in Government buildings, railroad company exhibits, and concessions on the Zone. In the corridors surrounding the courts of the exposition buildings, gas-lamps were also used, and were installed on ornamental staffwork brackets.

In the centre of the "Collective Gas Exhibit" building there was a great dome, 30 feet high, 28 feet square; and suspended from the dome, 20 feet from the floor, was a massive gas fixture, equipped with eight five-mantle low-pressure gas arc lamps, with mercury-valve distance-control. The candle power was approximately 5600; and the distribution of light was perfect. This was the largest gas fixture on the Pacific Coast.

In the sixty-one booths of the Collective Gas Exhibit the lighting was entirely effected with semi-indirect fixtures—either oxidized brass or Roman gold finish; and on the post in the aisles were large single-mantle and two-mantle lamps at a height of 9 feet. These were hung on artistic brackets, and, being in different colours, blended with the general colour scheme. The cost of the Collective Gas Exhibit pavilion was $13,400; and it was one of the finest pavilions in the Palace of Manufactures. In recognition of the splendid exhibit made of gas appliances, the Jury of Awards gave the Grand Prize to the Collective Gas Exhibit.

Behind the wonderful illuminating effect produced by gas at the Panama-Pacific International Exposition, and the various purposes it was made to serve, the high-pressure gas-distribution system of the Pacific Gas and Electric Company stood pre-eminently as the last word in distribution design. High-pressure gas at a minimum pressure of 30 lbs. to the square inch was used exclusively and delivered from the 16-inch high-pressure main artery, which extends from the Potrero Gas-Works, located at the south end of the city, almost around San Francisco to the North Beach holder station, connecting with an 8-inch continuous steel loop, which practically surrounds the exposition site. This loop entirely eliminates what are generally known as "dead-ends"—thereby ensuring perfect circulation.

Extending from the 8-inch loop was a 4-inch loop surrounding the Foreign and States sites; another 4-inch loop surrounding the Amusement Concessions; and a 2-inch loop along the Marina Esplanade—in all consisting of upward of 100,000 feet of welded steel mains.

Gas was delivered to the great palaces by means of 3-inch services welded to the mains, where a district governor was installed, reducing the high-pressure gas to a working pressure of from 4 to 6 inches, thence connected to the piping in the buildings. The same plan of distribution was adhered to in all the larger buildings, wherein were 4-inch and 6-inch loops, from which services were connected to supply each individual consumer. In the concessions territory, services were installed direct to each consumer, with individual house regulators connected to each meter, thereby reducing the gas to a pressure necessary to give the best results for the particular purpose for which the gas was used.

Since gas was sold directly to the Exposition Company, it became necessary to install apparatus for the measurement of high-pressure gas. Therefore, it was decided to install two Thomas electric meters—one for the main site and the other for the concessions territory. The meter depends for its operation upon the principle of heating the gas electrically through a fixed range of temperature as it flows through a passage, and measuring the quantity of electrical energy required to produce this rise in temperature. The cast-iron housings are located in the main line in street pits, while the recording panels were housed in a small building conveniently erected near by for observation purposes.

Having in mind the necessity of an adequate supply of gas for the exposition at all times, as well as eliminating one source only, Mr. E. C. Jones, the Company's Chief Engineer of the Gas Department, conceived a new installation; and the management authorized the extension of 8000 feet of 16-inch main, connecting the present high-pressure 16-inch main artery with the Metropolitan Gas-Works, located at North Beach, in the northerly end of the city. This installation was welded throughout by the oxy-acetylene process, already made famous by "Pacific Service"—thereby eliminating all joints, and creating a continuous steel main without leaks.

Gas was sold by the Exposition Company to its consumers at the rate of $1 per 1000 cubic feet for the first 50,000 cubic feet used in any one month, and 80 c. per 1000 cubic feet for a consumption in excess of this amount up to 300,000 cubic feet. At this latter figure a sliding scale was applied, which reduced the price to about 70 c. per 1000 cubic feet for some of the large consumers.

The total amount of gas used by the exposition from Feb. 20, the opening day, until Dec. 4, the closing day, was 122,934,900 cubic feet; and the daily average for this period was 426,926 cubic feet. The revenue derived from gas during the pre and post exposition periods was $14,759.62 and during the exposition period $89,570.90—making a total of gas revenue $104,330.52. This surely was a brave showing.

Another triumph for gas was the heating of the Festival Hall, the volume of which was 4,756,000 cubic feet, with a seating capacity of 4000 people. This was accomplished by eight hot-air furnaces, each capable of burning 440 cubic feet of gas per hour. It is also instructive to note that gas was the only fuel allowed on the grounds, with the few exceptions of plants which were sufficiently large to warrant the employment of an engineer, in which case fuel oil was permitted.

A high-pressure gas-service shop was installed in the grounds of the exposition, and was equipped in every detail. Three shifts were maintained, of two men each, for the twenty-four hours of the day and for the entire period of the exposition. An automobile emergency service stood prepared at all times of the day or night to give instant attention to any complaints; and from the opening to the closing day of the exposition there was no interruption of service. During the 288 days of the exposition there were received 206 legitimate complaints, or an average of a fraction less than one complaint per day. The gas used for lighting the various avenues and entrances, both in high and low pressure lamps, averaged 135,450 cubic feet per night.

**Naked Lights in Belfast.**—At an inquest on seven women who were burned to death in a fire in a Belfast marine store, it was stated that the conflagration arose through a bale of flax which a worker was carrying coming in contact with a naked gas-light; and the Jury expressed the opinion that there should be bye-laws providing means of escape in such cases.

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by Correspondents.]*

## Technical Research.

SIR,—With reference to the annual meeting of the Society of British Gas Industries held last week, I am glad to notice your comments on my suggestion for a further body to co-ordinate research, and welcome your suggestion of a "Central Technical Gas Research Association," which title would I think well describe the scope of such a body.

Although there is hardly likely to be any doubt as to the value of the work which would be carried out by an Institution of this description, it might be useful to invite an expression of opinion as to the best methods of settling its constitution. An exchange of opinions between the Institution of Gas Engineers and the Society of British Gas Industries would be valuable, before any concrete suggestions were put forward.

In my own opinion, the most important factor to be borne in mind would be the need to place at the disposal of such a body very large funds; while the possibility should be kept in mind that, if research on behalf of the gas industry were carried out by a recognized body, there might be a prospect of the Government co-operating financially, as I believe they are doing in connection with the Committee who are carrying out investigations on refractory materials.

There is no need to labour the fact that the industry has in some important respects been dependent on foreign, and especially German, goods and methods; but, granted that individual intelligence in this country is equal to that in Germany, with the co-operation of all interests and the support of the Government (conditions which have existed in Germany), this state of affairs can certainly be altered in the near future.

The question of foreign competition as it affects the gas industry of this country must be considered; and it was with some surprise that I heard Mr. F. W. Goodenough, in his remarks at the meeting, take the opposite view. If Mr. Goodenough is correctly reported, in referring to foreign competition, he said that "it was not a matter that was directly vital to gas undertakings." It is surprising that he, as Chairman of the British Commercial Gas Association, and in view of his position in the largest Gas Company in the country, should take this view. The question of tar and its derivatives, sulphate, foreign glass, and mantles—to name a few commodities—would appear to be subjects of direct interest to all gas undertakings. There is surely scope for much research work in these articles alone.

*Gothic Works, Upper Edmonton, April 6, 1916.* THOMAS GLOVER.

## The War and Capital Raising by Statutory Gas Companies.

SIR,—On Nov. 27 and Dec. 9, 1914, I ventured to address communications to you under the above heading. The discussion which arose on the Plymouth and Stonehouse Gas Bill (which came before the Unopposed Bills Committee last week) is naturally of considerable interest to me; and, although the points which I endeavoured to make as to the vast security a gas company can offer a mortgagee for the raising of loans does not come out in the discussion, it is obvious that this must be the basis for the issue of any mortgage or debenture.

The point I raised originally was that gas companies had not in the past taken advantage of the security they can offer for the raising of money on loan in some form or the other, in lieu of ordinary capital issues. I instanced the result of a compilation of figures from the Board of Trade returns, which showed gas companies' loan capital to represent only 16·68 per cent. of the total capital raised. I also showed that, by taking the companies enumerated in "Field's Analysis," on the average, the existing loan interest is covered in the amount of gross profits earned eight times, and that only six out of the twenty companies enumerated approach anywhere near the provisions of the "Model Clauses;" and the substance of my proposal was that the figures I had compiled justified a much larger proportion of:

(*a*) Loan capital than is at present in existence in the case of most gas companies.

(*b*) Even larger than the "Model Clauses" permit.

The reasonableness of this proposal was given effect to in the Ascot District Gas and Electricity Act of May, 1915, when the borrowing powers were increased to one-half. The provision in this Act, however, is permissive; and my contention is it should be obligatory.

It would not be difficult to show that such a practice is in the interests of consumers by providing capital at a lower interest ratio than by the issue of ordinary stock, but that it is also in the interests of the holders of the ordinary stock and would have the tendency to increase its value owing to the restricted amount on the market.

The question that has now arisen is a new point, but one that has been discussed in a different form on previous occasions—viz., the wisdom of making provision for a sinking fund for the liquidation of such loans; and it is not surprising that the authorities have taken time to consider a point of such importance.

At the time of communicating with you in 1914 I had in my mind short-period (say, five to ten years) renewable loans; and where there is such ample security as gas companies can offer, the question of a sinking fund does not necessarily arise.

I have for many years thought that all statutory companies, gas and otherwise, should be obliged to set aside a sum for the ultimate liquidation of their capital debt in a positive and open manner, as distinct from the practice of capital extensions out of revenue.

Such a principle would materially establish the floating credit of the undertakings, having such funds invested outside the business; and, in view of their position as trading concerns in perpetuity, it would tend to establish their credit, and enable them to meet unusual contingencies like those that have arisen.

In the case of respective gas undertakings a difficulty arises, as their financial status is based on two distinct principles. In the one case, a fairly liberal maximum price is fixed and a maximum dividend, which for all practical purposes renders such undertakings gilt-edged investments. The shareholders are not subjected to the commercial stress such as we are now passing through—the added burdens being passed on to the consumer; nor are they prompted to that economic expenditure of capital which the sliding-scale tends to bring about. With such companies it would be manifestly unfair that the consumer should be asked to bear the burden of contributing to a sinking fund.

In the case of sliding-scale companies, however, the position is different. The consumer shares in a larger measure than the shareholder in the economies brought about both in capital expenditure and working costs to the extent of, generally speaking, five-sixths. It is, therefore, not unreasonable to suggest that a sinking fund in the case of sliding-scale companies is a fair charge on the revenues of the undertaking, and the establishment of such a fund would tend to limit the present tendency of largely drawing upon revenue for expenditure which cannot always be shown to be fair maintenance charges.

There are but very few companies in existence to-day whose capital does not represent a larger figure than the structural value of their undertaking; and by this means, if by no other, errors of the past could be neutralized to the general advantage. W. R. HERRING.

*Palace Chambers, Westminster, April 5, 1916.*

## Heat-Resisting Glassware.

SIR,—We have read with much pleasure the report of the discussion by the Illuminating Engineering Society in your current issue.

As the proprietors of the registered trade mark "Monopel" [not "Monopol"], we are, of course, very much interested in the subject. It never has been our practice to endeavour to injure in any way rival brands; and, naturally, we are not disposed to quarrel with the conclusions arrived at by several speakers as to the relative merits of our glass as compared with "Jena." From our experience, we have come to the conclusion that there is no glass in existence which, under certain conditions, will not fog; but it has always been one of our principal claims that "Monopel" is freer from this trouble than other brands on the market. We have seen many specimens of "Resisto" and "Jena" which, after a short time in use, certainly have been fogged in a marked degree. As to the heat-resisting quality of "Monopel" there never has been any doubt; and this, after all, is the principal object to be attained.

As it is at the present time impossible to get "Monopel," "Jena," or "Resisto" glass, we shall be acquitted of any desire to obtain cheap advertisement when we say that we have for the past eighteen years controlled the output of "Monopel" glass in this country and the British Empire. The two partners in our firm are English both by birth and descent—employing a British staff. As another point in favour of "Monopel," we may mention that it is produced in Austria, which country is not regarded with such justifiable abhorrence by our people as Germany. On the other hand, both "Resisto" and "Jena" are produced in Germany, and are imported into this country by men of German origin.

As an English house, we should be delighted to learn that it is now possible to produce real heat-resisting glass in this country equal to that formerly obtained from abroad; and we should be only too pleased to co-operate in any way we can. M. BATEMAN AND CO.

*Brooke Street, Holborn, April 7, 1916.*

## The Products Restrictive Clause.

SIR,—Like the poor, the action taken by the Alkali Manufacturers Association against gas undertakings some years ago, continues and threatens to be with us always; and my reason for addressing you is to suggest a remedy that, while not likely to satisfy the Alkali Manufacturers, would in my view be sufficient to meet the principal objections raised against gas companies in the first instance of venturing into what was described as speculative and competitive business with the trading community.

It was shown that gas companies were a specially protected community without competition in their own trade, and that the gas consumer was in the majority of cases largely interested in their commercial welfare; that he shared in their losses as well as in their gains under the sliding-scale; and that gas companies' capital, raised for the legitimate purpose of gas companies' business, might be spent in carrying on a business for which there was no security of tenure, and which was at all times subject to open competition from the private trader.

The alkali manufacturers, on the other hand, realizing that the coal-gas industry was the primary source of many of their raw materials, were naturally desirous of securing to themselves this source of supply with as little competition in the purchasing of what was required as they could possibly bring about.

Whether they were justified in the course taken, is of no material importance at the moment. On the other hand, it is reasonable to admit that a good point against gas companies was made when it was shown that capital and revenue, in which the gas consumer was largely interested, was to be employed in a trade without a proper showing as to whether or not it was to the advantage or the disadvantage of the community.

If such a review of the case is reasonably sound, then it appears to me the gas consumers' interests could be safeguarded by making the residual products part of a gas company's business a self-contained entity, from an accounts point of view, so that the true working of what might be termed the subsidiary business could be open to the survey of the proper authorities, and the gas consumer thus assured that his interests were not prejudiced by such an extension of the gas company's undertaking.

In this respect not only must separate capital statements be kept, but clear working statements and vouchers appertaining to the particular branch, in the same way that the electrical supply part of a gas company's undertaking is now generally dealt with. COMPROMISE.

*April 5, 1916.*

[A comment on the above letter appears to-day in our editorial columns.—ED. J.G.L.]

# REGISTER OF PATENTS.

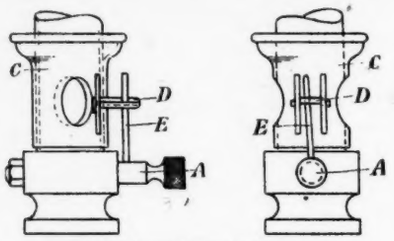
## Incandescent Gas-Burners.

CAMPBELL, F. W., of Bangor, co. Down.

No. 1537; Jan. 30, 1915.

This invention relates to means for regulating automatically the air supply of the incandescent burner through the medium of an air-regulating sleeve connected with the gas-regulating means.

Elevations are given, taken at right angles to each other, of a burner and its air-regulator, showing the gas-regulator adapted for simultaneous and adjustable regulation of the air supply.




**Campbell's Incandescent Gas-Burner.**

As shown, the pin A, regulating the gas supply, also operates the air-regulating sleeve C simultaneously with the adjustment of the gas supply. To this end the sleeve has a projection D capable of movement up and down relative to the sleeve and adapted to engage an arm E projecting upwards from the pin. Movement of the pin causes a corresponding and simultaneous movement of the sleeve C, and by moving the projection D up or down the amount of movement given to the sleeve is increased or reduced, so that the required adjustment of the sleeve relative to the movement of the regulator pin is obtained.

In burners fitted with the regulator, the pin operating the gas-regulating means would preferably be used for raising and lowering the light instead of the ordinary gas-tap, which would only be used when turning on or off the gas.

## Printing Mechanism for Counting Apparatus in Meters.

AUTOMETROGRAPH AKTIENGESELLSCHAFT, of Budapest, Hungary.

No. 5192; April 6, 1915. Convention date, April 14, 1914.

The patentees remark that printing mechanism in which the account clamped in a frame is introduced into the casing containing the counting apparatus is well known in meters; the casing containing a device by means of which the paper used for printing is capable of being pressed against the type with a relatively strong and uniform pressure. As, however, the pressure device is exceedingly sensitive as regards its precise adjustment, and calls for frequent re-adjustment, the object of the present invention is to provide mechanism wherein the pressure device is located in the paper-carrying frame used for insertion so that it may be easily adjusted and held ready for use without the necessity of opening the apparatus, "which in meters are usually kept under sealed closure." The printing mechanism comprises an expansible frame adapted to clamp the paper, and an impression roller located between the paper and the rear wall of the frame and adapted to press the paper against the type. This roller is movably guided, so that, in order to move the paper against the type, the frame is spread apart in a certain direction during the impression-throw of the roller. The invention is not further described apart from a series of closely lettered diagrams.

## Bye-Product Recovery from Gas-Producers.

TESTRUP, N., of Dean Farrar Street, S.W., RIGBY, T., of Dumfries, and WETCARBONIZING LIMITED, of Westminster.

No. 3677; March 8, 1915.

This invention relates to the recovery of bye-products in the gasification of peat, coal, and other fuels in producers having a distillation and a combustion zone; and it consists in an improved method of utilizing the tar, according to which, after distilling oil from the tar, the residual pitch is added again as fuel, thereby increasing the total yield of oil.

The pitch obtained from the distillation of the tar is distributed to the producer in such a manner that it is subjected to distillation by means of the outgoing gas; care being taken in the arrangement that the pitch is completely distilled before the residue reaches the zone of combustion. In order to achieve this result, the pitch is mixed as intimately as possible with the fuel, either in the liquid form by spraying or by mixing with the fuel in the form of small pieces. In the latter case, the pitch is preferably broken into pieces of such size as to be uniform with the particles of fuel by which the producer is fed.

The depth of the producer is preferably so arranged that the distillation of the pitch is complete before the residue reaches the combustion zone, which results in a high proportion of the volatile matter distilled from the pitch being carried forward in the producer gas as condensible products. The final result is that the tar which is condensed from the gas in the tar-extracting apparatus gives a higher yield of oil than is produced under ordinary conditions; and, consequently, when such tar is distilled, a much higher proportion of oil is given off than is the case with tar normally produced from the fuel.

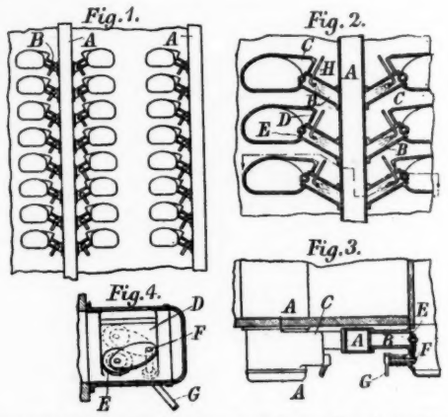
When working with peat fuel, the patentees mention, the tar normally produced gives off about 50 per cent. of oil in distillation—45 per cent. being pitch and 5 per cent. being wasted by decomposition, &c., in the distillation. The addition of the pitch to the producer in this cycle of operations results in nearly half as much oil again being produced. This means that from 100 parts of tar (calculated dry), 70 parts of oil as end-product are obtained It is also found that the nitrogen in the pitch, after distilling in the producer, is higher than in the original fuel from which the pitch came. In one case in which the fuel contained 1¼ per cent. of nitrogen, the pitch coke after distillation by this system showed 2 per cent. of nitrogen, with the result that in an ammonia-recovery gas-producer, the yield of ammonia is greater from this than from a corresponding weight of normal fuel. When working with coal, in one case, the tar normally produced gave on distillation 20 per cent. of the original bulk of tar (calculated dry) as oil; 75 per cent. being pitch, and the remainder lost in decomposition in the stills. When this pitch is fed to the producer in the correct ratio, it is found that the yield of oil per ton of tar (calculated dry) becomes approximately from 50 per cent. to 55 per cent. of the original weight of tar—the remaining 45 per cent. being gasified as pitch coke in the producer in the usual manner.

## Apparatus for the Manufacture of Gas.

CARPENTER, H. A., and the RITER CONLEY MANUFACTURING COMPANY, of Leetsdale, Allegheny County, U.S.A.

No. 5267; April 7, 1915.

This invention relates to apparatus in which a plurality of gas-retorts are provided, each of which communicates with a stand-pipe by means of a separate conduit between them to lead the gas away from the retort. The retorts are preferably arranged in vertical rows, and the retorts of each row may communicate with a separate stand-pipe, or the retorts of a plurality of rows may communicate with a common stand-pipe. Apparatus of this type is described in a prior patent, No. 5142 of 1914. One object of the present invention is to provide means for cooling the gas as it flows from the retort and at the same time to minimize the accumulation of stoppage-forming deposits in the separate gas-conduits and in the stand pipe.




**Carpenter's (Riter-Conley Company) Retort Bench Appliances.**

Fig. 1 is an elevation of a portion of a bench of retorts; fig. 2, a sectional elevation of one of the stand-pipes and the retort mouthpieces in communication; fig. 3, a sectional plan; and fig. 4, a sectional elevation of one of the mouthpieces.

As shown, two rows of retorts are disposed relatively close to each other and served by the single stand-pipe or off-take A, or a separate stand-pipe may be provided for each row. Each retort is in separate communication with the stand-pipe through the lateral conduit B (preferably inclined). The retort mouthpiece is formed inwardly from its front end with the lateral offset or triangular enlargement C, and with the conduit B opening outwardly and downwardly from the seat-forming face or wall D of the offset. The conduit preferably opens through the lower portion of the face, so that the valve E which operates on the face is in a lowered position when closing the conduit. The valve is adapted to move to the upper portion of the face D when open (as shown in dotted lines), leaving the conduit in unobstructed communication with the mouthpiece.

The valve is of disc form, and is pivoted to the valve-operating arm secured to one end of the shaft F, extending through a housing which may comprise an integral part of the mouthpiece, and projecting through it, being provided with the external operating arm G. A spring within the housing holds the shaft under constant tension with the valve pressed toward the seat. With the valve pivoted as shown, its position may shift, and thus cause it to wear uniformly as it slides on the face D, and always ensure a gas-tight fit over the conduit B.

To minimize the accumulation of deposits within the conduit, a pipe H enters therein, from which cooling liquid may discharge in the form of a spray. The pipe (preferably located close to the valve-closed end of the conduit) discharges towards the stand-pipe, so that substantially the entire length of the latter is subjected to the cooling action of the liquid; and with the conduit inclined as shown, the cooling liquid and the solids carried thereby drain into the stand-pipe.

With the cooling liquid constantly introduced into the passageway, the patentees remark that the "temperature of the gas is reduced immediately upon leaving the retort, and the resulting relatively low temperature at which the passageway is maintained greatly reduces the stoppage tendency, and correspondingly eliminates much of the cost and inconvenience incident to frequent cleaning."

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

The following further progress has been made with Bills:

Bill read the third time, passed, and sent to the Commons: Imperial Continental Gas Association.

Bill brought from the Commons, read the first time, and referred to the Examiners: Gas Provisional Orders Bill.

Bill returned from the Commons, with the amendments agreed to: Aberdeen Corporation Water.

## HOUSE OF COMMONS.

The following further progress has been made with Bills:

Burnley Corporation Water [Lords]: Read a second time, and committed.

Gas Provisional Orders: Read the third time, and passed.

Aberdeen Corporation Water: Lords amendments considered, and agreed to.

Plymouth and Stonehouse Gas, and Uxbridge Gas: As amended, considered, and to be read the third time.

Imperial Continental Gas Association [Lords]: Read the first time, and referred to the Examiners.

South Metropolitan Gas: Reported, with amendments.

The Beighton and District Gas Bill has been removed from the group of Bills to be considered by a Select Committee.

### Pooling of Railway Waggons.

Mr. ANNAN BRYCE (last Thursday) asked the President of the Board of Trade whether his attention had been called to the fact that the waggons of the Great Northern, Great Eastern, and Great Central Railway Companies had lately been pooled; whether the result of the pooling had been to relieve congestion; and, if so, whether he would use his powers to enforce the pooling of the waggons of other railway companies as well as of private waggons?

Mr. PRETYMAN (Parliamentary Secretary to the Board of Trade) replied that the arrangement between the three railway companies named had been in operation for some time, and he was informed that so far it had proved satisfactory. A somewhat similar arrangement had just been made experimentally between five other leading railway companies and might possibly be extended. As to private waggons, he could not add to the reply given on January 26 last.

### Metropolitan Water Board—Deficiency Account.

Mr. GILBERT asked the President of the Local Government Board whether his attention had been drawn to the deficiency account of the Metropolitan Water Board for last year and the estimated loss for this year; whether he sent the Board the circular issued to all other local authorities in London, urging them to reduce their expenditure during war time; and did he propose to take any action on the losses incurred by the Board, which loss would have to be met by a rate made on London ratepayers this year and next year?

Mr. LONG said that the answer to the first two parts of the question was in the affirmative. As to the last part, he might refer to the provisions contained in the Metropolis Water Act, 1902, for meeting deficiencies. The question whether it was desirable that these provisions should be altered had been under the consideration of the Metropolitan Water Board for some time, and he did not himself propose to take any action at present.

### Price of Coal (Limitation) Act.

On Wednesday, Sir A. Markham referred to the fact that last year a Bill was passed through the House for the purpose of limiting the price of coal. The date of the passing of the measure was July 29, 1915. He said that the Act was not being carried out in a great many cases at the present time, and that the House had, in point of fact, placed legislation on the Statute Book which was not being observed, but which was being set at defiance. If that statement be true, he wanted the Board of Trade to tell him why they did not take steps to bring to book the people who had been guilty of this offence. Sub-section (3) of Clause 1 of the Act provides:

> If any person sells or offers for sale any coal in contravention of this section he shall be liable, on summary conviction, to a fine not exceeding £100, or, at the discretion of the Court, to a fine not exceeding treble the amount by which the sum paid or payable for any coal sold by him.

He understood that the Government had not in one single case put this section into force; and he wanted to know whether that statement was true. What happens to-day is this. There is a shortage of coal. The man who wants coal goes to the colliery company and says, "I want coal." The coalowner says, "I have no coal to sell." The man who wants the coal says, "Yes you have. It is only a question of price." Then they agree to nullify the Act; and in many cases recently the two parties—that is, the buyer and the seller—have done that, and the buyer, of course, very much against his wish, has had to pay considerably more than the price laid down by Act of Parliament, otherwise the consumer would not have got his coal at all. Was the House content to allow people to set the Act at defiance and the Government to take no step? He had been pressing the Government to introduce an amending Bill; but the people who were fighting this amending Bill were the Mining Association, who threatened to use their influence in the House to prevent an amending Bill going through. He had previously urged that the average price of each quality of coal sold in the preceding twelve months should be taken, instead of what was called the corresponding price. It was opposed by the coalowners and the Mining Association, and the President of the Board of Trade gave way; and the consequence was that, unless there had been a sale made at the corresponding period, the coalowner was able to evade the Act. If the average price had been put in for each quality of coal realized in the preceding twelve months, there would have been no trouble in administering the Act. It could not be denied that a considerable number of coalowners were charging prices enormously above those which they were entitled to charge. It was known to everybody in the trade; and owing to the shortage of coal, this question was likely to become more acute if the Government were not going to enforce the Act. When we had great companies, even like the Gas Light and Coke Company, paying more than the prices laid down by Parliament, why did not the Board of Trade say that these contracts were outside the provisions of the Act, and insist that the people who broke the Act should be punished?

Mr. PRETYMAN said it had been generally agreed that the principle of price adopted in the Bill was better than the average price. On the whole the Bill was producing very satisfactory results. The price of coal had been kept down. He agreed with Sir A. Markham that it was the duty of the Board to do everything they could to keep the sale of coal within the actual limits imposed. They were trying to do this; but he must point out that the Bill did not impose on the Board of Trade, nor did the Board of Trade ever undertake, the duty of prosecuting in every case in which the allegation was made that the price charged was higher than the price in the Act. A duty to which Sir A. Markham did not refer was imposed by the Act on the Board of Trade—that was, where complaint was made to a Court that the price which was being charged was higher than the price permitted by the Act, the Court was to refer to the Board of Trade the duty of determining once for all what was the comparative price upon which the price was to be based, and reference had been made to the Board of Trade on this point and answers had been given. A great many communications reached the Board of Trade on this. They got these communications from day to day, certainly at the rate of one or two a day. They were all gone into. The conclusion come to was that the Act was working satisfactorily in the main, that the price of coal was very largely kept down by it, and that it would do more harm than good now, when people were becoming accustomed to the working of the Act, and when they were, generally speaking, complying with the requirements of the Act, to start a totally new basis which would involve immense calculation. It would be better if, instead of laying complaints before the House, Sir A. Markham would tell the people who had complained that they had the right under the Act to take the case into Court and to prosecute.

## SOUTH METROPOLITAN GAS BILL.

### New Stock-Issuing Clauses.

This Bill was sent forward for third reading by the Unopposed Bills Committee of the House of Commons last Thursday. It authorizes the South Metropolitan Gas Company to raise £250,000 of ordinary or preference stock, gives additional borrowing powers, and repeals unexercised powers of issuing capital and debenture stock.

Mr. BROWNE (Messrs. Dyson and Co., Parliamentary Agents) explained that the Bill gave the Company further financial powers which would be urgently needed in the near future, in view of the extremely high freights now prevailing for the conveyance of coal, added to the greater cost of coal itself. The Company had placed orders for five steamers to carry their own coal, and had already purchased four other steamers. The cost of the steamers would be £300,000, the greater part of which would be provided by the sum of £250,000 of ordinary or preference stock which the Bill asked power to raise. Owing to the high price of coal, the Company had a much larger amount of floating capital than was ordinarily required. This would be reduced when matters became more normal after the war. The Bill also asked power to borrow £500,000 on debentures or mortgage repayable in seven years. The proposition was to have a permanent borrowing of £100,000, on the condition that at no time was more than £500,000 outstanding. This was a war proposition; and it was for this reason that a redeemable stock was suggested.

The Committee, as already mentioned, sent the Bill forward for third reading.

The following are the clauses under which stock and redeemable stock will be issued:

10.—Section 7 (Conditions as to Issue of Debenture Stock) of the Act of 1882, sections 9 (Sale of Unissued Stock), 10 (Stock not Sold may be Offered to Shareholders, Consumers, and Employees), 11 (Purchase Money to be Paid within One Month after Sale), 12 (Notice to be Given as to Sale of Stock), and 13 (Application of Premiums on Sales of Stock) of the Act of 1896, and sections 6 (Sale of Unissued Stock), 7 (Stock not Sold may be Offered to Shareholders), 8 (Notice to be Given as to Sale of Stock), and 11 (Incorporating certain Sections of the Act of 1896) of the Act of 1901 are hereby repealed, and the following provisions shall apply and have effect in lieu thereof:

All stock or debenture stock created under the powers of this Act shall be in accordance with the terms of this section:

All stock or debenture stock so to be issued, whether the same be at a premium or not, may (with the approval of the Board of Trade, to be signified in writing under the hand of an Assistant Secretary of that Board), if the Company think fit, be offered by the Company to all the gas consumers and persons in the employ of the Company at as near as may be the average market price of such stock or debenture stock in the period of two weeks immediately preceding such offer (provided that in no case shall the price at which such stock or debenture stock shall be offered be lower than 5 per cent. below such market price). To ascertain the average market price of the stock or debenture stock for the purposes of this sub-section, the mean price recorded in the London Stock Exchange Daily Official List shall be taken for the said period of fourteen days:

Any stock or debenture stock which has not been so offered as aforesaid, or which has been so offered to, and not taken up by, such persons, shall, before being offered to the holders of any stock or debenture stock of the Company, be offered for sale by public auction

or tender, in such manner, at such times, and subject to such conditions of sale, as the Company shall from time to time determine:

Notice of the intention to offer to sell any stock or debenture stock in accordance with sub-section (2), or sub-section (3) of this section shall be given in writing to the Clerk of the London County Council, and of every local authority having jurisdiction within the district of supply of the Company, and to the Secretary of the London Stock Exchange at least twenty-eight days before the date of any offer under the said sub-section (2), or the day of sale by auction, or the last day for the reception of tenders under the said sub-section (3), as the case may be, and shall also be duly advertised once in each of two consecutive weeks in two or more daily newspapers published in London and circulating within the said district:

A reserve price shall be fixed for the purposes of any such sale by auction or by tender, and notice thereof shall be sent by the Company, in a sealed letter to be received by the Board of Trade not less than twenty-four hours before, but not to be opened till after, the day of auction or last day for the receipt of tenders, as the case may be:

No lot offered for sale by auction in accordance with sub-section (3) of this section shall comprise stock or debenture stock of greater nominal value than £100:

In the case of a sale by tender, no preference shall be given to one or more persons tendering the same sum; and in the case of a sale by auction, a bid shall not be recognized unless it is in advance of the last preceding bid:

It shall be one of the conditions of sale by auction or by tender that the total sum payable by the purchaser shall be paid to the Company within such period, not exceeding three months after the date of the auction or of the acceptance of the tender (as the case may be), as the Directors may determine:

Any stock or debenture stock which has been offered for sale by auction or by tender in accordance with sub-section (3) of this section, but not then sold, may be offered at the reserve price to the holders of ordinary and preference stock or debenture stock of the Company in accordance with the provisions of sections 18, 19, and 20 of "The Companies Clauses Act, 1863;" and for the purposes of those provisions as applied by this section, the said holders of preference stock or debenture stock shall be deemed to be stockholders. Provided that if the aggregate amount of stock or debenture stock applied for by such holders of ordinary and preference stock or debenture stock shall exceed the aggregate amount offered, the same shall be allotted to, and distributed among, the applicants as nearly as may be in proportion to the amounts applied for by them respectively.

Any stock or debenture stock which has been offered for sale in accordance with (*a*) sub-sections (2), (3), and (5), or (*b*) sub-sections (3) and (5), or (*c*) sub-section (3) of this section, and is not sold, may be again offered for sale by public auction or by tender, in accordance with the provisions of this section, and any such stock or debenture stock then remaining unsold may be otherwise disposed of at such price, and in such manner, as the Directors may determine for the purpose of realizing the best price obtainable:

As soon as possible after the conclusion of the sale, or sales, the Company shall send a report thereof to the Board of Trade stating the total amount of the stock or debenture stock sold, the total amount obtained as premium (if any), and the highest and lowest prices obtained for the stock or debenture stock.

11.—The Directors of the Company may, from time to time, notwithstanding the provisions of any Act relating to the Company, and without any further authority than is given by this section, raise—

By the issue of redeemable preference stock any portion of the capital which the Company are, or may be, authorized, whether under this Act or otherwise, to raise as preference capital;

By the issue of redeemable debenture stock any money which the Company are, or may be, authorized, whether under this Act or otherwise, to raise by the issue of debenture stock.

Subject to the condition that such redeemable preference stock and redeemable debenture stock shall be redeemed by the Company at such times, and in such manner, and on such terms and conditions, as shall be expressed on the certificates of such preference stock or debenture stock.

It shall be lawful for the Directors of the Company from time to time to issue—

New stock, whether ordinary or preference (and as regards any preference stock whether redeemable or otherwise), to such an amount as may be necessary to provide money for the redemption or purchase of any redeemable preference stock; or

New debenture stock, whether redeemable or otherwise, to such an amount as may be necessary to provide money for the redemption or purchase of any redeemable debenture stock.

Or to issue any such new ordinary or preference stock or new debenture stock for the purpose of redemption of, or in substitution for, any such redeemable preference stock or redeemable debenture stock (as the case may be). The provisions of this, or any previous, Act relating to the mode of issue of stock or debenture stock of the Company shall not apply to the issue to the holder of any redeemable preference stock or redeemable debenture stock of any such new ordinary or preference stock or new debenture stock by way of redemption of, or in substitution for, such redeemable preference stock or redeemable debenture stock, and such new ordinary or preference stock or new debenture stock may be issued direct to such holder.

The proceeds of any issue under sub-section (2) (*a*) or (*b*) of this section shall be applied for the redemption at maturity of any redeemable preference stock or redeemable debenture stock for the redemption of which such issue was made, but may, if the Directors of the Company think fit, be also at any time applied in the purchase of any such preference stock or debenture stock at a price not exceeding the redemption price, and any preference stock or debenture stock so purchased shall be cancelled.

## FOLKESTONE GAS BILL.

The Unopposed Bills Committee of the House of Commons presided over by Mr. J. H. WHITLEY had this Bill under consideration last Thursday. It empowers the Folkestone Gas and Coke Company to acquire the Hythe and Sandgate Gas Company, to extend the limits of the Company's area of supply to include the district under the Elham Valley Gas Order of 1912, to provide reserve and special purposes funds, and to substitute the calorific value test for the existing illuminating power test—the figure of 500 B.Th.U. being adopted, with penalties for any deficiency. The Bill also provides for the conversion of the existing capital of the Company. In a number of instances, the clauses of the Bill differed from the Model Bill clauses; and this fact was pointed out by the Committee. The position is that certain small and unimportant modifications of the Model clauses have been made to meet the wishes of the Folkestone Corporation; and there is no dispute between the Local Authorities concerned and the Company on these matters. It was the fact that the alterations are unimportant which led the Committee to object to them.

The CHAIRMAN said the Committee did not like these agreements altering the Model clauses, notwithstanding that by the alterations the Local Authorities regarded themselves as having looked after the interests of the consumers.

Mr. SEDGWICK (Messrs. Rees and Frere, Parliamentary Agents) desired to defend the course that had been taken.

The CHAIRMAN, however, said the Committee could not have the point argued; the Model Bill clauses must be adhered to. At the same time, the promoters might prove the preamble of the Bill now; but the Committee would not report to the House until satisfied that the Model clauses had been embodied. The Agent had better go through the measure, reinsert the Model clauses, and then submit the Bill to the Speaker's Counsel.

The preamble was then formally proved.

Mr. Arthur Valon was engaged on the Bill on behalf of the Folkestone Gas Company.

# LEGAL INTELLIGENCE.

## A Gas Consumer's Contract Question.

In the King's Bench Divisional Court, Mr. Justice Lush and Mr. Justice Rowlatt heard an *ex parte* motion by Mr. Cautley, on behalf of the Lea Bridge District Gas Company, for a rule calling upon the Justices of Essex (Stratford Division) to show cause why they should not hear and determine according to law a case in which they were alleged to have come to an erroneous decision. The Gas Company supplied gas to a man named Wood, who died in March, 1915; his widow continuing to live in the house. She paid the March and September accounts; but when the December account was sent in she objected, saying she had not used the amount of gas charged for. She had married a Mr. Morland the previous August; and the Magistrates dismissed the claim made by the Gas Company on the ground that there was no contract between the Company and Mrs. Morland. Their Lordships granted the rule asked for.

## Stockton Gas and Water Undertakings.

Further details are available respecting last year's very profitable working of the Stockton-on-Tees Corporation Gas-Works. As already stated in the "JOURNAL," the profit of £2311 estimated for the year, was exceeded by £3643, due to a reduction in the quantity of coal purchased and numerous administration economies. In addition to this, £1290 has been paid out of revenue for the reconstruction of the water-gas plant. The coal bill totalled only £23,325, whereas £26,700 was the estimated figure. War bonuses to employees cost £683, and allowances to workmen's dependants amounted to £1018. For the coming year, the total income, including the balance brought forward, is put at £65,443; and the Committee calculate on a surplus of £2500 for the borough rate and £1060 to carry forward. An increased expenditure on coal is anticipated—£27,810 being allowed under this head. From the sale of coke an income of £12,400 is looked for, as against £12,500 realized last year. In regard to water, the deficit came out practically as expected—a much more satisfactory result than the previous year, when the deficit was £12,812 instead of the estimated £4470, owing to increases in income-tax and redemption charges, and the estimated share of net revenue being over £4000 down. Interest charges and income-tax are on the upward grade for next year, and the deficit to the end of 1917 is put at £12,912, or a little under £200 more than for the twelve months just ended. Last year's total expenditure was £56,400, and this year's estimate allows for £60,400. As the Corporation's share of net revenue receivable from the Water Board last year was £40,417, and is estimated to be just over £200 more for the year just entered upon, it will be some time before the deficit is wiped out.

**Batley Gas-Works Results.**—On the occasion of the annual budget statement of the Batley Corporation, it was mentioned that, whereas in former years the gas undertaking had yielded from £2500 to £7000 in relief of rates, there were no profits to come this time. It had been hoped that better results might follow the advance of the price of gas; but it appeared that the plant was not as good as it should be, and it was understood that in the next few years the profits on the undertaking would be utilized to make the plant more efficient. It was observed by a member that in the last ten years £49,000 had been taken from the gas profits in relief of rates; and in the same period the water undertaking had been subsidized out of the rates to the extent of £16,000.

# MISCELLANEOUS NEWS.

## RATES OF DEDUCTION FOR INCOME-TAX.

The Inland Revenue authorities have issued a memorandum as to deduction of income-tax for the year 1916 17. It is pointed out that by a resolution of the House of Commons passed in Committee of Ways and Means on the 4th inst., and having statutory effect under the provisions of the Provisional Collection of Taxes Act, 1913, income-tax for the year commencing April 6, 1916, is to be charged at the rate of 5s. in the pound. Income-tax is accordingly deductible at the rate of 5s. in the pound in respect of—

PAYMENTS—CLASS I.

(*a*) Dividends and interest from the public funds payable on or after April 6, 1916.
(*b*) Dividends and interest of foreign or colonial government securities, or of foreign or colonial companies, entrusted to an agent in this country for payment here on or after April 6, 1916; also the like dividends or interest which, although not entrusted to an agent in this country for payment, are realized in the United Kingdom on or after that date through bankers, coupon dealers, or other persons.
(*c*) Interest and annuities paid by municipal corporations or other local authorities to creditors on rates, and not paid, or not wholly paid, out of profits and gains brought into charge to income-tax.
(*d*) Other interest and annuities not paid, or not wholly paid, out of profits and gains brought into charge to income-tax.

But in respect of—

PAYMENTS—CLASS II.

(*a*) Ground rents, &c., secured on property charged with income-tax.
(*b*) Interest or annuities wholly payable out of property, profits or gains charged with income-tax.
(*c*) Dividends paid out of the profits or gains of public companies in the United Kingdom.

Income-tax is deductible at the rate or rates in force during the period in which the same has or have been accruing—that is, in respect of any portion which accrued in the year ended April 5, 1916, at a rate equivalent to 3s. in the pound, and in respect of any portion accruing subsequent to that date at the rate of 5s. in the pound. In addition, where the last preceding payment was made prior to Oct. 6, 1915, a further deduction may be made of such a sum as is required to make up the difference between the total amount of the tax actually deducted from so much of the previous payment or payments as accrued after April 5, 1915, and the total amount of the tax that would have been deducted if the rate of tax had been 3s. in the pound throughout the year commencing April 6, 1915.

## REVISED LIST OF CERTIFIED OCCUPATIONS.

There was issued last week a revised list of certified occupations, which, it must be clearly understood, is, like the previous one, subject to further revision from time to time as the industrial situation of the country may demand—occupations being added to, or withdrawn from, the list.

Certain trades and some occupations have been entirely removed from the list; and in other cases the list of exempted occupations has been modified. The general effect of all these alterations is to reduce considerably the number of exemptions. On the other hand, a few small trades have been added to the list.

### Certified Occupations.

The Government Departments concerned have certified, after consultation with the Army Council, that the work of men in the following occupations is work of national importance, and that, subject to the provisions as to individual certificates contained in the regulations and instructions, the classes or bodies of men who are employed or engaged in these occupations, and who fulfil the conditions specified as to age, marital condition, and date of entering their present occupation, are exempted from the provisions of the Military Service Act, 1916, or from being called up for military service if they are voluntarily attested men. The conditions as to age and marital condition, where applicable, are indicated in the list. Men who, on Nov. 2, 1915, were unmarried or were widowers without any child dependent on them, are to be treated as single men for the purposes of the list.

With the exception of those employed in railway service and in the occupations marked M.M. and H.O.,* men in the occupations included in the list are covered only if they can show that they were engaged in the same occupation on or before the date when the National Register was made, Aug. 15, 1915. The certificate covering the occupations marked M.M. will expire on May 1, 1916. On and after that date, men will only be exempted on the ground of the requirements of munitions work if they are entitled to hold a war service badge certificate or are on May 1 the subject of an application for war service badges upon which a decision has not been given by the Ministry of Munitions. Some modification will be made in the list of certified occupations before May 1 in consequence of this provision. Any man whose principal and usual occupation is one of those in the list, and who wishes to be exempted, must apply to the Local Tribunal of the place of his employment for an individual certificate of exemption, unless he is a man employed in connection with coal mining. Cases of the latter kind are to be dealt with by the Colliery Recruiting Courts, in accordance with arrangements made by the Home Office. A certificate held on March 1, 1916, in connection with an Admiralty, War Office, or War Service badge, is, while it remains in force, a certificate of exemption; and a man holding such a certificate need not ordinarily apply for a certificate to the Local Tribunal on grounds connected with employment. All certificates of exemption are liable to review in accordance with the regulations and the instructions.

* The Ministry of Munitions are responsible for the occupations marked M.M., and the Home Office for those marked H.O.

The list includes the following occupations of particular interest to "JOURNAL" readers.

ALL INDUSTRIES—GENERAL EXEMPTIONS.

ENGINEMAN—Engineman or engine tenter; crane driver. M.M.
STOKER—Stoker or boiler fireman.
MECHANICS, &C.—Mechanics and similar men engaged in the maintenance and repair of their employers' plant, machinery, and tools.
WORKS CHEMIST.
CARTER, LORRYMAN, AND DRAYMAN (HORSE OR POWER)—In all trades, not engaged in collecting from, or delivering to, private houses.

MINING AND QUARRYING.

COAL-MINING—Men below ground—All classes. H.O. Workmen above ground—Colliery fitter; colliery mechanic; electrician; pumpman; weighman (including checkweighman); winding engineman. H.O.
FIRE-CLAY MINING AND QUARRYING—All underground workmen in mines; foreman (above ground) at mines and quarries; getter or quarryman in quarries.
COKE BURNING—Coke burner; chucker; filler; runner; screener; oven leveller; oven loader; oven stoker; cinder burner; gas-regulator; quencher; ram engineman; shale burner. M.M.
PATENT FUEL WORKS—Foreman; beltman or loader; trolleyman.

METAL, ENGINEERING, AND SHIPBUILDING.

BLACKSMITH, ENGINEERING AND SHIPBUILDING. M.M.
BRASS AND BRONZE MANUFACTURE OTHER THAN FOUNDRY—All classes of workmen. M.M.
BRASS FINISHER. M.M.
BRICKLAYER (FURNACE) FOR METAL TRADES. M.M.
CAST AND WROUGHT IRON DOMESTIC AND SANITARY WARE MANUFACTURE—Foreman or charge hand; lathe hand (spinner and trimmer); annealer; tinner; enameller; pickler; burner or fuser; galvanizer.
CRUCIBLE MAN (POT FIREMAN). M.M.
CUPOLA MAN (FOUNDRY). M.M.
DRESSER (FOUNDRY). M.M.
DRAUGHTSMAN (Mechanical, not tracer). M.M.
DRILLER, ENGINEERING—Radial and vertical. M.M.
ERECTOR—Constructional iron or steel work; machine. M.M.
FETTLER (FOUNDRY). M.M.
FITTER (excluding stove, grate, and range fitter)—(Engineering and shipbuilding). M.M.
FITTER, METAL PIPE (excluding gas fitter and plumber). M.M.
HOLDER-UP—Constructional Ironwork. M.M.
LABOURER—Constructional iron or steel work; coppersmith's; fitter's (engineering or shipbuilding only); foundry; turner's (engineering or shipbuilding only). M.M.
MACHINIST, AUTOMATIC (ENGINEERING ONLY). M.M.
MOULDER, IRON, STEEL, AND OTHER METALS. M.M.
PATTERNMAKER (ENGINEERING OR SHIPBUILDING WORKS). M.M.
RIVETER (HAND, HYDRAULIC, OR PNEUMATIC).—Boiler; constructional ironwork. M.M.
RIVET HEATER. M.M.
SAND BLASTER (ENGINEERING ONLY). M.M.
SHEET IRON AND SHEET METAL WORKER. M.M.
SMITH (DROP OR POWER HAMMER). M.M.
TEMPLET MAKER (METAL; WOOD)—Constructional ironwork; engineering and shipbuilding. M.M.
TUBE MANUFACTURE, IRON, STEEL, COPPER, AND ALLOYS (FOR ENGINEERING AND SHIPBUILDING)—All classes of workmen. M.M.
TUBING (FLEXIBLE METALLIC)—All classes of workmen. M.M.
TURNER—Engineering and shipbuilding. M.M.
WELDER AND CUTTER, ACETYLENE, OXY-HYDROGEN, AND ELECTRIC (HEAVY WORK). M.M.

BRICK, &C., TRADES.

FIRE-CLAY GOODS, MANUFACTURE OF—Maker; kilnman.

CHEMICAL, &C, TRADES.

CHEMICAL LABORATORIES—Head laboratory attendant.
CHEMICAL TRADES—Foreman; overlooker; process man (man in charge of any chemical process).
CHEMISTS—Analytical, consulting, and research chemists to be exempted if recommended for exemption by the Royal Society.
LEAD BURNER (Chemical plumber). M.M.
TAR DISTILLING—All classes of workmen. M.M.

PUBLIC AND PUBLIC UTILITY SERVICES.

LOCAL GOVERNMENT AUTHORITIES, officials (other than those in classes mentioned below) on the administrative or technical staffs of—Those men to be exempted to whose exemption the Military Representative agrees.
GAS-WORKS—All classes of workmen inside the works.
WATER-WORKS—All classes of workmen engaged in the provision and distribution of water, including men employed by hydraulic power companies.

RECOMMENDATIONS.

*Proprietors and Managers.*—The directing head of every considerable business of real national importance should be given exemption from military service. If there is more than one directing head, the Local Tribunal should consider whether the business is of such a size or complexity that more than one head is essential. The Local Tribunal will have to determine in doubtful cases whether any person claiming exemption is in a controlling position, and whether no efficient substitute can be found. In settling this question, the age of the applicant and the length of his experience in the business should be taken into account. Thus, as a general rule, it may be assumed that men of less

than thirty years of age, and with a small financial interest in the business, are not indispensable as directing heads. As regards small businesses, the Local Tribunal must decide whether or not the claim for the exemption of any man is reasonable.

*Clerks in Industrial Establishments.*—In most industries, there are certain clerks who are indispensable on account of their technical knowledge, their intimate acquaintance with their employer's business, or the managerial and directing character of their work. It is impossible to separate these men by classification from other clerks who can be replaced, as the distinction depends upon the circumstances of the individual case rather than upon the description of the occupation. Needful exemptions must therefore be left to the Local Tribunals, after consideration of each case on its merits.

**Statement Showing Material Alterations (Apart from Age Limits) in Revised List.**

I.—*Trades which have been Removed from the List.*

METAL, ENGINEERING, AND SHIPBUILDING.

Galvanized sheet manufacture. M.M. Tinplate manufacture.

II.—*Trades within which the Exemption has been Altered.*

MINING AND QUARRYING.

| *Original List.* | *Revised List.* |
|---|---|
| Shale Mining. | Oil-shale mining. |

METAL, ENGINEERING, AND SHIPBUILDING.

| | |
|---|---|
| Acetylene welder. M.M.<br>Electric welder and cutter. M.M. | Welder and cutter, acetylene, oxyhydrogen, and electric (heavy work). M.M. |
| Brass and bronze manufacture other than foundry: All classes of workmen (including turbine blade drawer). M.M. | Brass and bronze manufacture other than foundry: All classes of workmen, M.M.<br>Turbine blade drawer. M.M. |
| Brass finisher, fitter: Brass finisher, fitter, turner. M.M. | Brass finisher. M.M.<br>[Brass fitter included under reservation "Fitter (excluding stove, grate, and range fitter)"]. M.M.<br>[Brass turner included under reservation "Turner"]. M.M. |
| Brass founder: Dry sand moulder; green sand moulder. M.M.<br>Moulder, iron and steel: All classes. M.M. | Moulder, iron, steel, and other metals. M.M. |
| Brazier. M.M.<br>Ironplate worker. M.M.<br>Sheet metal worker—All industries: General exemptions. M.M.<br>Tinsmith—All industries: General exemptions. M.M. | Sheet iron and sheet metal worker. M.M. |
| Buffer. M.M.<br>Cast and wrought iron domestic and sanitary ware manufacture—<br>Foreman or charge hand.<br>Lathe hand (spinner and trimmer); annealer; tinner; enameller; pickler; burner or fuser. | Buffer (engineering only). M.M.<br>To occupations in original list "Galvanizer" has been added. |
| Constructional ironwork erector. M.M.<br>Steel worker (builder). M.M. | Erector—Constructional iron or steel. |
| Draughtsman, Mechanical. M.M. | Draughtsman (mechanical, not tracer). M.M. |
| Fitter—All industries: General exemptions. M.M. | Fitter (excluding stove, grate, and range fitter): (Engineering and shipbuilding.) M.M.<br>Fitter, metal pipe (excluding gasfitter and plumber). M.M. |
| Labourers, erectors', fitters', turners', and other labourers engaged in engineering work:—<br>Constructional ironwork labourer; coppersmiths' labourer; erector's labourer (building); fitter's and turner's labourer; rigger and heavy lifter; tinsmith's labourer. M.M. | Labourer:—<br>Constructional iron or steel work. M.M.<br>Coppersmith's. M.M.<br>Fitter's (engineering or shipbuilding only). M.M.<br>Foundry. M.M.<br>Turner's (engineering or shipbuilding only). M.M.<br>Rigger and heavy lifter. M.M. |
| Labourers, foundry (iron and steel): Dresser; fettler. M.M | Dresser (foundry). M.M.<br>Fettler (foundry). M.M.<br>Tinsmith's labourer *deleted*. |
| Patternmaker — all industries: General exemptions. M.M. | Patternmaker (engineering or shipbuilding works). M.M. |
| Blacksmith — all industries: General exemptions. M.M. | Blacksmith, engineering and shipbuilding. M.M. |
| Templet Maker—Wood; metal. M.M. | Templet maker (metal, wood)—Constructional ironwork; engineering and shipbuilding. M.M. |
| Tube manufacture (iron and steel)—All classes of workmen. M.M. | Tube manufacture, iron, steel, copper, and alloys (for engineering and shipbuilding)—All classes of workmen. M.M. |
| Turner—All industries: General exemptions. M.M.<br>Lathe operator—Gisholt; turret. M.M. | Turner (engineering and shipbuilding). M.M. |
| (*Not in original list.*) | Crucible man (pot fireman). M.M. |
| (*Not in original list.*) | Cupola man (foundry). M.M. |

FURNACE FIRE-BRICK MAKER FOR METAL TRADE. M.M.

The men exempted under this heading in the original list are covered in the revised list by the wider reservation—Fire-clay goods, manufacture of—Maker; kilnman.

PUBLIC AND PUBLIC UTILITY SERVICES.

Water-Works—The previous reservation, "All classes of workmen engaged in the provision and distribution of water," now reads: "All classes of workmen engaged in the provision and distribution of water, including men employed by hydraulic power companies."

III.—*Trades which have been added to the List.*

MINING AND QUARRYING.

Patent Fuel Works—Foreman; beltman or loader; trolleyman.

BRICK, &C., TRADES.

Fire-clay goods, manufacture of—Maker; kilnman.

## HEROES OF THE GAS INDUSTRY.

### Preston Gas Company's Proud Record.

To the names of those connected with the gas industry who have distinguished themselves on the field of battle is added that of Private William Young, V.C., who was employed by the Preston Gas Company as a labourer for about six months, leaving them during April, 1914, to join the firm of Gas Distribution Limited, of Nuneaton, who were then laying high-pressure mains for the Preston Gas Company in the district. The gallant winner of the coveted distinction was a reservist when he left the Nuneaton firm on Aug. 4, 1914. The "London Gazette" announces that the Victoria Cross was awarded him for most conspicuous bravery under the following circumstances: "Private William Young, No. 5938, 8th Service Battalion, East Lancashire Regiment, seeing his sergeant had been wounded, left his trench to attend him under heavy fire. The wounded N.C.O. requested Young to get under cover; but he refused, and was himself very badly wounded by having both jaws shattered. Notwithstanding his terrible injuries, Young continued endeavouring to effect the rescue upon which he had set his mind, and eventually succeeded, with the aid of another soldier. He then went unaided to the dressing station, where it was discovered he had also been wounded by a rifle bullet in the chest. The great fortitude, determination, courage, and devotion to duty displayed by this soldier could hardly be surpassed." Private Young is at present in hospital at Exeter recovering from the terrible wounds he received. He joined the Army in 1899, and went to the front with the Expeditionary Force; being wounded in the thigh at Ypres in November, 1914. After nine weeks' leave he returned to action; but in September last he was injured in his eyes and "gassed," necessitating a three weeks' sojourn in hospital. Letters home from officers pay striking tribute to his bravery. One of them states: "He was always cheerful and willing. Many of the men always looked to him in moments of difficulty. He had a heart of oak." According to the latest accounts, Private Young, V.C., is making good progress towards complete recovery.

Altogether, the Preston Gas Company have seventy-four employees who have volunteered for military and naval service; five having been killed in action. In the recently-published list of naval distinctions appears the name of Leading-Seaman Cluny Cameron Campbell, who has been awarded the Distinguished Service Medal. Campbell, as a naval reservist, was called up at the outbreak of war, when he was working as a prepayment meter collector for the Preston Gas Company, in whose employ he had been for several years.

Apart from Campbell and Private Young, V.C., another employee of the Preston Gas Company who has won distinction in the war is Private C. Riley, of the Loyal North Lancashire Regiment, who was awarded the Distinguished Conduct Medal last September for conspicuous gallantry at Bixschoote in October, 1914.

### What Manchester is Doing.

Intimation had been received by the Manchester Corporation Gas Department of the death of two of their former employees—both having been killed in action in France. Private Herbert Moor, of the East Lancashire Territorial Force, and Private Joseph Gibbons, of the King's Shropshire Light Infantry (formerly of the Royal Field Artillery), were both employed in the Street Mains and Lighting Department of the Manchester Corporation, and joined the Colours on the outbreak of war. Of the 620 men of the Manchester Corporation Gas Department who have joined the Services, 18 have been killed, 29 wounded, 3 are missing, and 4 are reported as prisoners of war.

**Causes of Fires in the City.**—The annual report of Dr. F. J. Waldo, as Coroner for the City and Southwark, which has been submitted to the Common Council, states that, under the City of London Fire Inquests Act, 165 fires (compared with 139 in 1914) were officially notified to him during the year. In each case a careful investigation followed, as the result of which the cause was in 148 instances discovered, and in only 17 did it remain unknown. In the case of 26 fires investigated by him, as against 11 in the previous year, he had, with the expert assistance of the Electrical Engineer, been able to decide that they were due to defective electrical arrangements. Of the total number of fires, 47 were caused by a light being thrown down—in most instances carelessly. Dr. Waldo once more took the opportunity of suggesting the advisability of an extension of the City Fire Act to his jurisdiction in Southwark—and, indeed, to the whole country—as recommended by the Home Office Committee in 1909. Of the 26 deaths due to fires and scalds, 15 were cases of children under the age of five years, who were left alone in rooms with fires in open grates or gas-stoves unguarded, or cases in which the children had set themselves alight with matches.

## SALFORD CORPORATION GAS DEPARTMENT.

### An Estimated Deficit on the Year's Working.

At a Meeting of the Salford Gas Committee on the 27th ult., a resolution was adopted "that the sum required to meet the estimated deficit on the working of the gas undertaking for the financial year ending March 31, 1915, be borrowed from the district fund."

On the minutes being submitted for approval at last Wednesday's meeting of the Council, Mr. Royle sought more precise information as to the result of the year's working. He hazarded a guess that the estimated deficit might be anything from £25,000 to £50,000, and declared he would not be a party to passing a resolution of this kind till the Council were supplied with more information. He moved that the minute of the Committee be referred back for this purpose.

The Chairman of the Gas Committee (Alderman F. S. Phillips, J.P.) pointed out that the resolution passed on March 27 merely referred to the course to be taken when the time came for some definite action. It did not mean the actual borrowing of a single penny. Another resolution would be proposed when the proper time came, and that would be the occasion to deal with the question.

The minutes of the Committee, which included the foregoing resolution, and one recording interviews with certain coal contractors as to current contracts, and reductions in prices under the provisions of the Price of Coal (Limitation) Act, 1915, were then agreed to.

The Council also approved a recommendation of the Gas Committee directing that hospitals under the control of the British Red Cross Society be supplied with gas free of charge.

## FOLKESTONE GAS BILL.

### Town Council's Agreement with the Company.

Minutes of the General Purposes Committee which were approved at the monthly meeting last week of the Folkestone Town Council, stated that the Sub-Committee reported they had agreed the following amendments to the Gas Company's Bill; and, subject to these amendments, the Sub-Committee recommended the withdrawal of the Corporation's opposition to the Bill.

By the Bill it was proposed that the standard price of gas should be 3s. 6d. per 1000 cubic feet, with a reduction of the standard dividend of 5 per cent. if the price exceeded 3s. 10d., and a corresponding increase in dividend if the price fell below 3s. 6d. The amendment agreed is that the standard shall be 3s. 4d. per 1000 cubic feet, with a margin up to 3s. 9d. instead of 3s. 10d., and with power for either party to apply to the Board of Trade within five years after the termination of war to revise the standard. The authorities of Hythe, Sandgate, and Cheriton are also to have power to make a similar application to the Board of Trade, but before doing so to give two months' notice of their intention to Folkestone. The price in Hythe is to be 6d. per 1000 feet more than in Folkestone for the first ten years, and in the country districts in the outer area to be 1s. more than in Folkestone. The charge for prepayment meters to be 10d. per 1000 cubic feet, instead of 1s., including a cooker. It is understood that in the great majority of cases where there is a prepayment meter there is also a cooker. The amount of capital upon which the payment into, and accumulations of, the special purposes fund is to be calculated is to be £200,000 in respect of the present paid-up capital and any new capital. By the Bill it is proposed that, instead of an illuminating power test, there shall be a calorific test, and that the standard as originally inserted in the Bill was to be 500 B.Th.U. It is now agreed that the standard shall be 540 B.Th.U.; but the Company will not be subject to penalties unless the gas falls below 500 B.Th.U. It is said that it is impossible to prevent a variation; and Parliament recognized this in a previous case, when the question was thoroughly gone into and a variation of 7½ per cent. was allowed. It was stated, on behalf of the Company, that gas of a calorific power of 540 B.Th.U. gives an illuminating power of from 14 to 14½ candles. The Company are to continue the provision of a testing-place and apparatus at the works for testing illuminating power, but are not to be subject to penalties in connection with the illuminating power. The pressure is to be a minimum of 20-10ths from sunset to 10 p.m., and 12-10ths during the remainder of the day, instead of 8-10ths for the twenty-four hours as proposed in the Bill. Certain powers for the protection of the Corporation in connection with gas-mains in streets are to be included in the Bill. There are other matters of detail which were agreed upon.

## TRIBUNALS AND EXEMPTION APPLICATIONS.

The Garw and Ogmore Gas Company have been granted conditional exemption for all their men of military age at the works at Tondu; the military being satisfied that the works are understaffed. All the men had attested.

At Haywards Heath, application was made for the exemption of a single man employed at the gas-works as a brick-setter and general labourer, who, it was urged, should have been starred. Conditional exemption was granted until July 1.

Exemption was claimed at a sitting of the Harwich Tribunal for eight employees of the Gas Company. It was stated that all the men were indispensable to the carrying-on of the business. The Company were employing seventeen men over military age. They had 12 miles of mains in the borough, and between 5000 and 6000 customers. Last month they had 200 leakages which required immediate attention. Ten of the Company's employees had already joined the Colours. Conditional exemption was given to all the men except one, an outside fitter, who was given temporary exemption of one month.

Before the District Committee of the East Sussex Appeal Tribunal, the chief clerk and head of the rental and collecting department of the Bexhill Water and Gas Company appealed against the local decision of three months' exemption. It was contended that, owing to enlistments, the Company had no employee able to take the man's place. Applicant declared that the clerks under him could not work without his supervision. They were substitutes, put there owing to enlistments. He attested at the end of November, and was quite willing to accept the Tribunal's decision. The appeal was dismissed; but leave to appeal to the Central Tribunal was granted.

At the West Bromwich Military Tribunal last Tuesday, Mr. W. H. Johns (the Gas Engineer) applied for exemption for his Chief Assistant (Mr. F. E. Cox). He pointed out that he himself was at present engaged on work for the Ministry of Munitions; and Mr. Cox took his place, and had charge of the gas-works when he was away. Mr. Cox had been to the military barracks at Lichfield, where he was medically examined, and was passed for sedentary work only. The Chairman (Mr. E. Wood) said in that case the Tribunal would grant three months' exemption. They felt Mr. Cox would be more usefully employed in his present position than he would be on sedentary work under the military authorities.

The position in regard to military service of sheet-metal workers, who include a large number engaged in the gas-meter trade, was raised in a case dealt with by the Nottingham Appeal Tribunal last Friday, when, in support of his application for exemption, an employee of a local firm of gas-meter makers presented for the consideration of the Court a letter which he had received from the Hull Braziers and Sheet Metal Workers' Society, of which he was a member, explaining that, though this branch of the national organization was not in a position to make any special arrangements, yet according to the decision of a meeting of delegates, any members joining the army did so upon their own responsibility, and would cease to pay contributions to, and receive benefit from, the Union during their absence. This on the face of it, the communication added, might appear to be an unpatriotic measure; but it was regarded as essential and necessary to the best interests of the nation, in view of the extreme demand for sheet-metal workers. All the members, it was contended, could claim exemption as belonging to a starred trade, and could obtain a badge or certificate to this effect from the recruiting tribunal. The application was refused by the Court; the applicant being apparently oblivious of the emendations in the recently revised lists.

An interesting case was heard by the Ripon City Council last week; an appeal being made by Mr. J. Wilfrid Dunn for conditional exemption while engaged in reorganizing the gas-works, for which scheme he has been appointed Consulting Engineer. Mr. Dunn explained that he had already done much work in connection with the scheme; and he considered that he was thus serving his country better in a civil capacity than he would be in military service. The work was of much importance to the community—not only to the citizens, but also to the camp. He was 26 years of age, and in group 31. The Military Representative (Admiral Milton) remarked that he felt bound to ask the Tribunal to give Mr. Dunn to him. He did not wish to say a word against the Corporation, or about the business they were doing. No doubt they had adopted an excellent scheme; but it was applicant's father's scheme. Mr. Dunn said this was not the case. The scheme was his own. He was absolutely alone in this, and had had the approval of such an eminent engineer as Mr. W. Doig Gibb. Tenders were already invited; and he had been busy interviewing the contractors' representatives, and explaining the requirements to them. The Tribunal granted temporary exemption to June 30.

The Tribunal for the Uttoxeter Urban Area refused exemption to a stoker at the gas-works.

Application for exemption on behalf of a coal carman was made by the Chertsey Gas Company; the Secretary stating that he had been unable to find a substitute. One month was granted.

At Maidenhead, J. H. Eaton, a gas-fitter (not attested), appealed through his mother. He is employed by the Maidenhead Gas Company, who wrote stating that their fitting staff was much depleted. They were constantly doing Government work. It was explained that Eaton has five brothers in the army, and is the only one left at home. The Chairman remarked that the family had done splendid service, and he was sorry the Tribunal were unable to help applicant. They could not give leave to appeal.

The Woking Water and Gas Company appealed to the Surrey Appeal Tribunal on behalf of their Outside Superintendent (Mr. Thomas Crane). It was urged that the Company, who were supplying a public necessity, must have a sufficient staff. They were spending over £5000 in additional machinery and mains; and it was most difficult to secure labour for the class of work of which Mr. Crane had charge. The Company had had to close the meter-repairing shop. Ten of their eligible employees had enlisted. Three months were granted, with leave to apply again.

At the Southwark Tribunal a clerk employed by the Gas Light and Coke Company applied for conditional exemption. In a letter from his employers it was stated that applicant was engaged on useful and important work in the manufacture and distribution of gas. He also appealed on domestic grounds as the support of his parents; his father being 70 years old. Had it not been for his parental obligations, he would have joined the forces long ago. He was granted a month in which to make domestic arrangements.

At Pudsey, the Gas Company appealed on behalf of several employees. A clerk, aged 23, married, was said to do important work which could not be performed by a woman, and he was also going in for an examination on May 6 on "Gas Supply." An application for a labourer was withdrawn. Three stoking machine operators were held to be indispensable, as young and tactful men were necessary for this work. Further applications were for the Resident Works Manager and Secretary, a mechanic and electrician, a chief clerk, a fitter, and a labourer. The Tribunal decided to put back to May 10 the clerk who had the examination; the application for the chief clerk was refused. All the others were put back to Aug. 1, conditional on their remaining at the same work.

Stockport Furnaces Limited has been registered, with a capital of £2000, in £1 shares. The Directors are Messrs. J. Lord, E. Duckworth, and J. Litherland.

## AN ARBITRATION AS TO THE PRICE OF WATER.

An arbitration has been held at the Surveyors' Institution, Great George Street, S.W., before Mr. G. J. Talbot, K.C., extending over seven days in February and March, to determine the price at which the Bradford Corporation are to supply water in bulk to the Spenborough Urban District Council, for the purpose of distribution by the Council in two parishes or townships—Cleckheaton and Gomersal—which now form part of the area of the Urban District.

Mr. E. Honoratus Lloyd, K.C., and Mr. F. G. Thomas (for Mr. H. W. Beveridge, on active service), instructed by the Town Clerk, appeared for the Bradford Corporation. Mr. E. F. Vesey Knox, K.C., and Mr. W. E. Tyldesley Jones, instructed by Mr. W. H. Clough, Solicitor, and Messrs. Torr, Durnford, and Co., appeared for the Spenborough Council.

Mr. Honoratus Lloyd, in opening, stated that the arbitration took place under the Bradford Corporation Act, 1913; the material part being Part V. The water limits of the Corporation were defined, and included Cleckheaton and Gomersal; and the Water-Works Clauses Acts were applied throughout the water limits. By section 19, the obligation was placed upon the Corporation to distribute water in every part of the water limits outside the city at the same prices, and on the same terms and conditions, as those at which the Corporation may for the time being be supplying water within the city; and the Corporation were prohibited, except by agreement, from levying outside the city any rate-in-aid. The local authorities outside obtained, by section 20, an option; and if, instead of taking a supply under section 20, they or any of them (with certain exceptions) desired to take a supply in bulk, they must give notice within twelve months from the date of the passing of the Act. Then the Corporation were bound to supply and continue to supply; and they were to take exclusively from the Corporation in bulk. By section 22, local authorities taking water in bulk may subsequently give notice and require distribution by the Corporation in detail. The section which was the subject of the arbitration was section 21, as follows:

> The price at which, and the condition on which, the Corporation shall supply water in bulk to any council entitled to require the same under the provisions of this part of this Act shall, unless agreed between the Corporation and such council, be settled by arbitration; and at the expiration of a period of twenty years from the date of the passing of the Act, and at the expiration of each succeeding period of twenty years, the price may be revised on the application of either party by arbitration.

Section 38 provided for the appointment of a single arbitrator, and the application of the provisions of the Arbitration Act, 1889. Notices requiring supplies in bulk were served by Cleckheaton on Dec. 11, 1913, and by Gomersal on April 4, 1914,; but on Aug. 18, 1914, an order was made by the Local Government Board uniting Liversedge (supplied by the Corporation in detail) with these two districts into one district, as the Spenborough urban district. So that the Council of this district now spoke for Cleckheaton and Gomersal, and asked that the price for bulk supply to be paid during the next twenty years should be determined. These districts had for years been supplied by the Corporation with water in bulk at 9d. per 1000 gallons. Counsel, after pointing out that it was the price, and not the conditions, which (by arrangement) the parties desired to have determined, placed before the Arbitrator figures dealing with capital expenditure on completed works, estimated expenditure on works in progress, and present consumption and estimated increase in consumption; and, applying these to the year 1924 (as the middle date in the period of twenty years from 1914), he arrived at a present cost of 7·8d. per 1000 gallons, and a cost of 9·05d. in 1924. Adding 12½ per cent. to this figure to represent the risk of finance, risk to works, &c., the price of 10·18d. per 1000 gallons was obtained, which was put forward by the Corporation as a fair price to be paid by the Council.

Alderman J. E. Fawcett (the Acting Chairman of the Water Committee), Mr. James Watson (the Water Engineer), Mr. C. G. Henzell (of Leeds), Mr. F. O. Whiteley (the City Treasurer), Mr. T. Paton (Accountant), and Mr. W. Terrey (of Sheffield) gave evidence on behalf of the Corporation.

Mr. Knox, in opening his case, stated that the question really was whether the Spenborough Council should pay 10d. per 1000 gallons, as claimed by the Corporation, or 6d., which was the figure the Council would contend for. He drew attention to the fact that, on the evidence, the price of 9d. hitherto paid was much more than the cost to the Corporation of the water supplied at this figure; and that the price had only been agreed to by reason of the peculiar position of Cleckheaton and Gomersal under the old Bradford Acts. These Acts prevented them from getting water from any other authority, but did not compel Bradford to supply water unless it so pleased, and consequently placed Cleckheaton and Gomersal entirely in Bradford's power. The intention of the Act of 1913 was to redress this state of things, and to provide that, given reasonably economical distribution by local authorities taking a bulk supply, the price for this bulk supply should be such that the water-rates paid by consumers in all parts of the water limits might be approximately equal. He commented on the fact that the Corporation witnesses had given an all-over cost including the cost of distribution, and had not attempted to ascertain the actual cost of a supply in bulk. His evidence would agree within about ¼d. the all-over cost of the water, but would claim deductions from this all-over cost of over 7d., of 0·762d. in respect of sinking fund, and 1·9d. cost of distribution—bringing, with certain adjustments, the present cost of water for bulk supply to 4·6d. per 1000 gallons. With respect to the sinking fund, the cost of this should be excluded, because the sinking fund would make the works the property of Bradford free of charge. The payments to it were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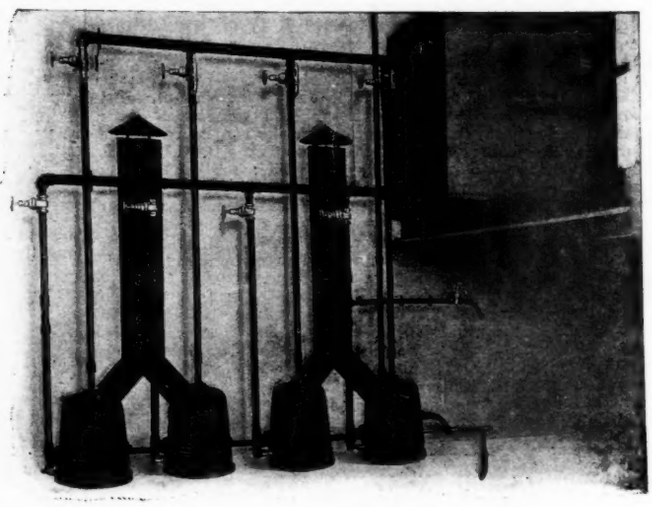

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not part of the annual cost of the water, but part payment of the capital cost of the purchase-money, and the urban district would not ultimately become owners or part owners of the undertaking. With respect to the estimate of additional cost during the twenty years, Counsel stated that, whereas Mr. Watson had alleged that the present water resources of Bradford would not give more than 17,000,000 gallons per day over three dry years (or little over the present consumption), and had calculated on spending over £1,000,000 before 1924 on a new reservoir and other extensions in the valley of the Nidd, Mr. Hill would show that the present resources, and especially the dry weather flow from unreservoired areas, had been much underestimated, and ought not to be put at less than 21 million gallons per day. On this basis, the sum of £1,000,000 need not be fully expended before 1930; and the additional capital coming into charge in 1924 would be less than one-half the sum estimated by the Corporation. Making what his witnesses would contend was a sufficient allowance for additional cost during the twenty years, and adding to 4·6d. a covering allowance of 10 per cent., as against Mr. Lloyd's 12½ per cent., he arrived at the figure per 1000 gallons as the proper price to be paid under the section of the Act.

Mr. J. H. Linfield (the Clerk to the Council), Mr. H. Prescot Hill, and Mr. W. Cash gave evidence on behalf of the Council.

The Arbitrator took time to consider his award.

## METROPOLITAN WATER BOARD.

### Recent House of Lords Appeal.

In the last volume of the "JOURNAL" for 1915 was a report of the House of Lords proceedings in the case of the disputed assessment of the Walton pumping-station and intake of the Metropolitan Water Board. The Law and Parliamentary Committee have since submitted their views on the subject, in the course of a detailed notice of the proceedings.

They say: The Board's appeal came on for hearing before the House of Lords on Oct. 26 and was continued on Oct. 28 and 29 and Nov. 1; a reserved judgment being delivered on Dec. 9. The House comprised Lord Loreburn (in the chair), Lord Atkinson, Lord Shaw of Dunfermline, and Lord Parker of Waddington.

The subject of the appeal was a rate made on May 9, 1912, when the hereditaments in question—consisting of an intake from the River Thames, canal, pumping-station, and premises situated in the parish of Walton-on-Thames, and owned and occupied by the Board—were assessed at a gross estimated rental of £15,750, and a rateable value of £10,500.

The questions for consideration by the House of Lords were: (*a*) Whether the hereditaments had an enhanced value by reason of the user made of the intake and the statutory right of appropriating water drawn from the River Thames by means thereof, and the proximity to the river and the special fitness of the piece of land for taking water from the river into the aqueduct or canal to the Board's pumping tanks; (*b*) Whether the case of the "*New River Company v. Hertford Union*" (1902. 2. K.B. 597 C.A.) was rightly decided, and, if so, whether it was distinguishable from the present case; (*c*) whether regard could be had to the rate at which the Board can borrow money in fixing the percentages to be taken in arriving at the rateable value of the hereditaments in question.

The decision of the House may be shortly stated as follows: That in assessing the property for rating purposes, the proper basis of assessment is to take the cost of the land and of the erection of the buildings and works, and then to take a percentage on the cost in order to arrive at an annual value, and that no further sum should be added as being enhanced value in respect of the user of the intake and the statutory right of appropriating water from the river; also that the facts that the Board was the only possible tenant and could borrow at less than the current rate of interest were no grounds for taking the percentage at less than the current rate.

In the report presented to the Board on May 29, 1914, the decision was referred to of the Court of Appeal in the case of the "*New River Company* v. *Hertford Union*," which laid down the principle that the statutory right to take water, and the user of an intake for that purpose, was an element of assessment, and must be taken into account in arriving at the assessment. The Board were strongly advised that this decision was based on a wrong principle of rating; and in the present case this was argued at considerable length on behalf of the Board, with a highly satisfactory result. It will be seen from the judgment that the House of Lords expressed the view that if the Hertford case laid down the principles for which the respondents contended, then they were unable to accept that authority as sound law.

The principles laid down will be applied to the Board's other intakes; and the Edmonton Assessment Committee have already agreed to reduce the assessment of the King George reservoir at Chingford.

At the conclusion of the judgment, a discussion took place, and Counsel for the Assessment Committee made an effort to obtain an order that the costs of Quarter Sessions should be borne by both parties. But this was not assented to; and the position, therefore, is that the Board are entitled to their costs in the Quarter Sessions proceedings, and that the parties will bear their own costs in the Higher Courts.

Following the decisions above referred to, the rateable value of the King George reservoir at Chingford has been reduced by the Edmonton Assessment Committee from £11,436 to £10,406; and this will obviate the case being taken to Quarter Sessions.

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## NOTES FROM SCOTLAND.

**Gas Lighting in the Lanarkshire Housing Scheme.**—The Lanarkshire Middle Ward District Committee, who take a leading part in Scotland in town planning and housing schemes, have just decided to adopt gas lighting in the numerous workmen's dwellings they are erecting in connection with the Mossend housing scheme. A Sub-Committee had under consideration the question of installing electric lighting in the houses in Unthank Road. The estimates showed that electric lighting would cost £8 5s. per house, and gas £4 5s. per house. In view of the cost, the Sub-Committee agreed not to further pursue the question of electric lighting; and the District Committee have accordingly adopted the recommendation to introduce gas. The Committee, at the request of the Bellshill Gas Company, took into consideration the question of whether ordinary gas-meters or prepayment meters should be introduced into these houses; and they have decided that the Gas Company be asked to provide ordinary meters.

**Warning against Zeppelin Raids in Scotland.**—Some months ago, when the possibility of Zeppelin raids on the Scottish coast was first seriously considered, the Town Council of a city concerned, acting along with the military authorities, decided upon certain methods of warning the inhabitants of the approach of hostile aircraft—the chief being the reduction of the electric light to a dim red glow. Last Sunday week, at about 9 p.m., the electric light was reduced to this condition; and those householders who use electricity as an illuminant, and also persons in the streets, received timely warning. Efforts were made, by special constables and others, to warn gas consumers; but in many cases the first intimation of danger to this large section of the community was the reverberating explosion of a bomb at about 11.20 p.m. A gentleman who uses gas informed the writer that his wife, family, and servants went to bed on the Sunday night at the usual time, and that he was quietly reading by the drawing-room fire, when he was almost deafened by an explosion, and alarmed by a large quantity of red-hot soot shooting out of the chimney on to the hearth-rug. A subsequent examination revealed the fact that 34 panes of glass and three chimney-pots had been broken. Clearly, the methods of warning were open to improvement; and hence the authorities (wise after the event) are reviewing them. The proposal favoured is first to reduce the pressure of the gas at the works (by which means the lights would be lowered, and consumers apprised that information of enemy aircraft had been received in the city), and then to cut off the supply altogether. Householders, on noticing their diminished gas-lights, would turn them out; and resort to candles or oil-lamps. At a meeting of the War Emergency Committee held last Friday, representatives of the gas authority pointed out that, if the proposal to warn gas consumers by manipulating the supply were carried out, it would not be unattended with danger. It was therefore decided to give the subject further consideration.

**Municipal Burghs and Excess Profits Duty.**—In the course of the proceedings at the Convention of Royal Burghs, held in Edinburgh last week, Mr. P. M. Kirkpatrick, Town Clerk of Hamilton, moved that, having regard to the questions arising under the Finance Act, 1915, as to excess profits duty in respect of municipal undertakings, such as gas and electricity works, and to the dubiety which existed whether loans were to be regarded as capital employed in such concerns, it be remitted to the Annual Committee with powers to take action as they consider necessary to protect the interests of the burghs, and to advise and assist town councils in the matter. This was seconded by Mr. John Pollock, Town Clerk of Selkirk, and adopted.

## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *April* 10.

The price of pitch remains steady at 19s. to 19s. 6d. per ton, net, in bulk, at makers' works, with a moderate amount of business being done. Fair quantities of tar are being removed; buyers realizing the importance of anticipating their requirements as much as possible, in view of transport difficulties. In other products, values are about the same as last reported.

The export price of 25 per cent. sulphate of ammonia remains unchanged at £17 5s. per ton, net, into buyers' bags, at makers' works. The market is quiet, but steady.

### Tar Products in the Provinces.

*April* 10.

There is little alteration in the markets for tar products. Pitch remains the same. Creosote is very quiet, and sales are reported at lower prices. There appears to be more solvent naphtha offering, and lower prices are stated to have been accepted. Heavy naphtha is in good demand.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 6d. to 19s. 6d. Pitch, East Coast, 15s. to 15s. 6d. per ton; West Coast, 14s. to 14s. 6d. Manchester; 15s. to 15s. 6d. Liverpool; 17s. to 17s. 6d. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 7d. Solvent naphtha, naked, North, 2s. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2⅛d. to 2⅜d. Heavy oils, in bulk, 3⅞d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene, salts, 80s., bags included. Anthracene, "A" quality, 2d. to 2¼d. per unit; "B" quality, nominally ⅜d.

### Manchester Tar Prices.

The average price realized for tar—based on the value of the products—for February deliveries, in the Manchester district, was 22s. 8d.


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### Sulphate of Ammonia in the Provinces.

LIVERPOOL, *April* 8.

During the past week there has not been any alteration in the situation; the market having remained quietly steady. Buyers have not shown much keenness to operate, pending developments with regard to the issuing of export licences; but there has not been any pressure on the part of makers to effect sales. At the close, quotations are still £16 17s. 6d. per ton f.o.b. Hull, £17 f.o.b. Liverpool, and £17 2s. 6d. f.o.b. Leith. It has transpired that business has again been done for July to December delivery in equal monthly quantities at £17 7s. 6d. to £17 10s. per ton f.o.b. at the ports.

### Nitrate of Soda.

This market is strong, and holders on spot now require 17s. 7½d. per cwt. for ordinary, and 18s. 7½d. for refined quality.

### Sulphate of Ammonia.

From another source it is stated that quotations are as follows: Outside London makes, £15 17s. 6d.; Hull, £16 12s. 6d.; Liverpool, £16 15s.; Leith, £16 17s. 6d.; Middlesbrough, £16 15s.

## COAL TRADE REPORT.

### Northern Coal Trade.

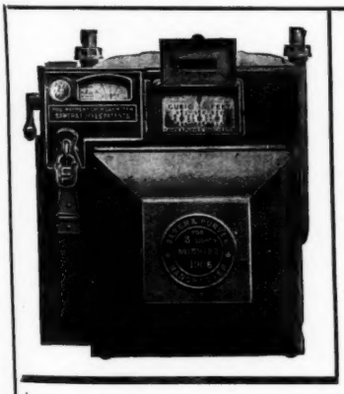
The coal trade is affected by the desire to get cargoes away before the holidays lessen the output. On the other hand, tonnage is still rather scarce, and this impedes the shipment. In the steam coal trade, the demand is very brisk; and for prompt supplies there are stiffer prices asked, which have in some instances to be paid. Best Northumbrian steams are now quoted at 40s. per ton f.o.b.; for second-class steams about 32s. to 33s. per ton; and for steam smalls, from 16s. to 22s. per ton is the current price. In the next few days it is possible that higher quotations may be made; but the extent of the arrivals of steamers for coal cargoes will be one of the chief factors. In the gas coal trade, the inquiry is steady, but consumption is now falling, though the wish to replenish stocks shows itself freely at times. Best Durham gas coals are 25s. 6d. to 26s. per ton f.o.b.; second-class gas coals are about 25s.; and "Wear Specials" are 27s. to 27s. 6d. per ton f.o.b. The strong demand for Durham coal for other uses is having some influence on the price of gas coal; and the high rates of freight tell in the cost delivered. About 17s. to 17s. 6d. is now the Tyne to London freight, and 47s. 6d. has been paid for Rouen—gas coal being still in good request for France. There is little reported as to contracts for gas coal, though some have been fixed during the last few days, and others are in close negotiation. Gas coke is little altered—good qualities being from 26s. 6d. to 28s. 6d. per ton f.o.b. in the Tyne.

**Reduced Lighting and the Rates.**—The Burton-on-Trent Town Council have sanctioned a rate of 8s. 2d. in the pound, which compares with 8s. 6d. last year. Requirements had been under the estimates; one of the principal items of saving being £2160 on street lighting, owing to the reduced illumination. The increased charges made for gas have resulted in the Gas and Electricity Committee being able to vote a contribution of £5000 towards the rates.

**Dorking Gas Company.**—It was reported at the half-yearly meeting of the Company that the balance available for division amounted to £2002; and the Directors recommended the payment of a dividend at the rate of 5 per cent. per annum on the various classes of shares, leaving a sum of £752 to be carried forward. The manufacturing results had been satisfactory; but the high price of coal and other materials, together with the lighting restrictions, had caused considerable anxiety.

**Public Lighting at Frimley.**—In moving the adoption of the estimates for the ensuing twelve months at last week's meeting of the Frimley Urban District Council, General Dalrymple called attention to the figures in the lighting account, because he said the outside public, seeing the balance they carried over, might think the Council ought to have reduced the lighting rate. As a matter of fact, the effect of a reduction of only 1d. would have absolutely swallowed up the whole of the balance in the North Ward with the exception of a few shillings, and would have run the South Ward into debt. In the North Ward they showed a liability to the Yorktown and Blackwater Gas Company of £231; but this amount could not be taken as what was admitted to be really due. It was the amount based solely on the rebate which the Company proposed to allow for lamps out of lighting, but which the responsible Committee thought to be utterly inadequate. The Council paid the Company approximately £2 17s. 6d. per lamp per annum, and the proposed rebate was, on an average, 10s. 6d. per lamp.

**Variation of Lighting Agreement at Leatherhead.**—As a result of negotiations, the Clerk of the Leatherhead Urban District Council has submitted to the Lighting Committee several suggestions for varying the existing lighting agreement with the Leatherhead Gas Company—viz., (*a*) Payment to be made to the Company at the rate of 20s. per lamp per annum for those unlighted since the lighting order came into force, instead of the contract price of £3 per lamp; (*b*) an allowance in respect of lamps previously unlighted, at the rate of 6d. per lamp per week; (*c*) payment for the twelve lamps lighted at present at the rate of £4 10s. per lamp, per annum. At last week's meeting of the District Council the Committee recommended acceptance of the above terms. The Clerk explained that there were 157 lamps altogether, of which 102 belonged to the Council. It should be borne in mind that they were not only paying the Company for the amount of gas consumed, but also for capital lying idle, and for standards, mains, and works. A case had already been decided where a Council had to pay a gas company the full amount of their contract; and he suggested that, although it might run into a lot of money, the terms they were offered were a fair and reasonable settlement. The recommendation was agreed to.



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**Belfast Electricity Failures.**—At a meeting of the Belfast Corporation, Alderman Tougher drew attention to the failure on two recent Saturdays of the electric light supply, and said great inconvenience had arisen on the evenings in question. Mr. M'Caughey, replying for the Electricity Committee, said they must attend to their statutory obligations; and they were "cribbed, cabined, and confined" in regard to them.

**Blackpool and the Hawking of Coke.**—At the last monthly meeting of the Blackpool Town Council, a lengthy discussion took place on a recommendation of the Gas Committee that, with the object of protecting the ratepayers from being excessively charged for coke, none shall be sold at the gas-works for the purpose of being hawked on the streets of the town. An amendment was moved that, without prejudice to existing contracts, only residents in the borough be supplied. The amendment was defeated, as were two others of a similar nature.

**Lincoln Municipal Undertakings.**—Owing to the increased cost of coal and other additional expenses, the Lincoln Corporation do not find themselves in a position this year to grant anything in relief of rates from the gas, electricity, and water supplies, and this despite the fact that the extra charges entailed by the war have led to the prices for electricity and gas being raised. The additional revenue derived has enabled the Council, as Alderman T. Wallis explained in presenting the estimates, to close the year's accounts of the undertakings in a thoroughly sound manner. By maintaining the water-rate at the same figure as last year, it is anticipated that expenses will be met.

**Coupling-Up Gas-Mains.**—At a meeting of West Bromwich Town Council last Wednesday, Alderman J. Brockhouse (the Chairman of the Gas Committee) referred to the arrangement that had been proposed [*ante*, p. 50] with neighbouring authorities for the coupling-up of gas-mains in the event of air raids and damage to any of their works. He thought it was a very good scheme; and the Council must approve of it. If their gas-works should be damaged, it would be an easy matter to couple-up their mains with Smethwick, Birmingham, Oldbury, or Tipton, and thus avert very great inconvenience to the town. The recommendation to support the scheme was agreed to. The Oldbury Gas Committee have also approved of the scheme.

**Newmarket Public Lighting Contract.**—At a special meeting of the Newmarket Urban District Council, it was stated that the Gas Company, to whom an offer of £250 had been made as compensation for loss of profit on their contract in the present year, through the total suspension of public lighting, had written referring the Council to the case of the Leiston Gas Company, but stating that they would, nevertheless, accept in settlement half the amount of the contract figure, provided the offer was accepted within fourteen days. The sum payable under the contract is £981 per annum. The Council were of opinion that they had offered the Company a sum which was amply sufficient to cover any loss they had sustained through the non-fulfilment of the contract; and it was unanimously resolved that the offer of £250 be adhered to.

**Increased Price at Barrow.**—The Barrow Town Council have opposed a recommendation of the Gas Committee to increase the price of gas 6d. per 1000 cubic feet, to 3s. The borough rate has been fixed for the ensuing year at 5s. 4d. in the pound, which is a reduction of 9d. on the previous year.

**Cost of the Derwent Water Scheme.**—Some formidable figures are embodied in the annual accounts just issued of the Derwent Valley Water Board; the net expenditure to the end of last year totalling £3,571,460. Of this, £671,888 has been spent on the construction of the Derwent reservoir, £661,491 on that at Howden, and £95,286 on the Ambergate reservoir. The parliamentary expenses in connection with the project involved the authorities in an outlay of £107,650. Lands and easements cost £297,000, and interest absorbed £405,820. Upon the Sheffield branch to Ambergate £367,721 was expended; the Leicester and Derby joint pipe cost £67,773; the Leicester pipe, £72,253: and the Nottingham pipe, £50,473. Upon filters, the outlay has been £84,770. The working and other expenses last year aggregated £178,320.

**Cleveland and Durham Electric Power, Limited.**—At the tenth annual meeting of the Company, the Chairman (Mr. James Falconer, M.P.) said there was a diminution in the gross profits of £5081, due to the exceptional way in which the undertaking had been affected by the war. The cost of production had increased. In the first place, the amount of current which they had developed at the waste-heat stations had been seriously reduced; and in the absence of this waste heat, energy had to be supplied through coal-fires. Mr. Gemmell remarked that it was not much consolation to hear from the Chairman that waste heat had failed them when they required it most, and when coal was dear. He suggested a Government inquiry into the position of the Company, and intimated that he was not able to support the passing of the accounts. The report was adopted; and a dividend of 2 per cent. was declared on the preference shares, leaving £8574 to be carried forward.

**A Tragedy at Thetford.**—Last Saturday week, Mr. Charles Snelling, the Manager of the Thetford Gas-Works, was stabbed by his brother-in-law, Samuel Ley, an ex-Metropolitan Police Inspector, who afterwards inflicted fatal wounds upon himself. Mr. Snelling was fortunately well enough to attend the inquest on the following Monday, when he stated that on the Saturday deceased had called on him and complained of his head being bad. They chatted for some time, when suddenly Ley jumped up and stabbed witness with a knife, inflicting a flesh wound. A doctor was sent for, and attended to him; and later, while left alone for a while, deceased cut his own throat. The doctor when he went to the gas-works and questioned Ley, said he did not seem to realize that he had stabbed Mr. Snelling. He thought the man was out of his mind, and suggested that the police should be sent for. Directly he got home, he was again summoned to the gas-works to attend deceased. The Jury returned a verdict of "Suicide during temporary insanity."

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### Primitiva Gas Company of Buenos Ayres.

The report of the Company for the year 1915, which will be submitted at the meeting next Tuesday, states that the total amount at the credit of profit and loss, including the sum brought forward, is £221,413. Interest charges, depreciation on office furniture, income-tax, London expenses, and amount added to pension fund, absorb £114,925. From the balance of £106,488 has to be deducted an interim dividend of 2s. 6d. per share, free of income-tax, paid in July last, amounting to £62,500. This leaves a balance to the credit of profit and loss of £43,988; and it is proposed to transfer from general reserve £18,512, to make up the amount required for the final dividend of 2s. 6d. on the preference shares. Owing to the continued financial depression in Buenos Ayres, and the effect of the war on freights and cost of coal, the net revenue of the Company decreased by £93,809; and the Directors regret that, in order to cover the final dividend on the preference shares paid on Jan. 1 last, it has been necessary to take the sum named from the reserve fund. There was a very serious falling off in the sales of gas, mitigated to a certain extent by an improvement in the prices of coke, residuals, and chemical products. Notwithstanding that every effort has been made to obtain from the Buenos Ayres authorities permission to increase the selling prices of gas, they have refused to meet the Company in any way, and have so far insisted upon the concession prices being adhered to. The network of mains was increased by 8 miles, making a total of 1136 miles; and 2337 new services were connected with the system, making a total of 205,446. The Company's works have been maintained in full and efficient repair out of revenue; but it has not been possible to make any provision in these accounts for the Retiro works amortization.

**Holsworthy Gas and Electricity Supply.**—The annual meeting of the Holsworthy Gas and Electric Supply Company was held last Thursday, when the statement of accounts submitted showed total receipts from the gas undertaking of £1095, and from electricity of £295. The Directors recommended a dividend of 2 per cent. The Chairman (Mr. J. M'T. Dickson) regretted that the year's working did not show a more satisfactory result. The increase in the price of coal, the reduction of public lighting, and economy by private consumers had affected them. The report was adopted.

**Dartmouth Gas Company.**—The report submitted to the annual meeting of the Dartmouth Gas Company recommended payment of interest on the debentures and dividend on the cumulative first preference shares; the Directors expressing regret that they could not pay dividends on the second preference shares and the ordinary shares. The sum of £500 had been written-off the capital account for works demolished. Mr. H. Adams (the Chairman) said coal was now costing 38s. or 39s. per ton. They had appointed Mr. J. B. Cattle (late Manager of the Martock and District Gas-Works) as Manager; and the energy he had displayed had given the Directors satisfaction.

**Otley Gas Company.**—The annual report of the Company states that the net profits for 1915, including £10,424 brought forward, amounted to £14,586. A further dividend of 3 per cent. has been declared, making 5½ per cent. for the year, and £11,442 is to be carried forward.

**Price of Gas at Birstal.**—At Birstal the price of gas has been increased by a further 3d. per 1000 cubic feet, on top of a 6d. rise last year. The year closed with a deficit of £506. The make of gas was 39 million cubic feet, as against 44½ millions the previous year; the reduction in public lighting accounting for the difference.

**Increased Charges for Water at Torquay.**—A new scale of charges for water was submitted to the Torquay Town Council last Tuesday, and was adopted. Mr. Cove explained that the Water Committee found it necessary to increase the charges because of the large amounts which had to be paid for taxes and for interest on loans. For the past year £3300 was put down in the estimates for rates and taxes; but the actual amount paid was nearly £1000 more, while the income from water-rentals was £800 less than the estimate. In the estimates for the current year, £5000 was calculated as the amount required for rates and taxes, and £13,225 for interest and redemption of debt, as against £11,984 last year. The increase in the latter case was due to the fact that people now wanted a higher rate of interest. At the present charges for water there would be a deficiency on the year's working of £4160. Mr. Smerdon pointed out that the increased charges would yield only £1000, so that there would still be a large deficit. The Borough Treasurer remarked that in the coming year, the income-tax would be four times higher than before the war.

**The Explosion at a Blackburn Gas-Works.**—The Blackburn Branch of the Associated Brassfounders, Turners, Fitters, and Coppersmiths' Society have passed a resolution supporting the request of the Labour party in the Town Council for a public inquiry into the explosion last December at the Addison Street works of the Blackburn Corporation. At the monthly meeting of the Town Council last week-end, the Labour Party again moved the appointment of a committee of inquiry; but on a division the resolution was lost by 33 votes to 8. Mr. Johnson, who moved the appointment of the Committee, recalled that a statement had been made that the explosion had been deliberately caused, and said that previous application for an inquiry had been refused on the plea that the matter had been placed in the hands of the Chief Constable of Blackburn for investigation. An inquiry, he contended, would settle whether the accident was deliberately or accidentally caused. Mr. J. W. Holgate (the Deputy-Chairman of the Gas Committee) reminded members that one of their number—Mr. E. Porter, the local Secretary of the National Union of Gas Workers and General Labourers—had stated at a previous meeting that he knew the name of the man who had caused the accident; that the accident was not caused deliberately or maliciously; but that he objected to giving the man's name without "certain safeguards." Mr. Holgate added that the Chief Constable's inquiries were still being pursued.


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## Water-Works Employees and Exemptions.

The Wakefield Corporation applied for the total exemption of three employees, on the ground that if the city water undertaking was to be carried on it was absolutely necessary that an irreducible number of men should be kept. One man, who was 37 years of age, was in charge of the works at the Ardsley reservoir and also of the pipe-line from Cooper Bridge to the reservoir. The man who could take his place had already enlisted ; and another man would have to be with this one for fully twelve months before he could be entrusted with the work. The second man was 35 years of age, a water-man at Ardsley, and inspector of another section of pipe-line. He had been doing this particular work for eight years ; and as he was of military age they had tried to replace him, but found it quite impossible. The third man was a turn-cock and water inspector engaged in the city. When war broke out the Corporation had four men doing this class of work ; and now there were only two left, of whom this man was one. This was the lowest number they could keep, as in the event of two bad bursts occurring simultaneously in different parts of the city it must be possible to send a skilled man with each gang of workmen. There were over 100 miles of pipes within the city ; and one man only could not do this work. They had tried for six months to replace the man, but had not had a single application for the post. If the work was left to one man only, it would mean that the supply of water would have to be cut off in the event of accidents. Exemption was granted in all three cases, conditionally upon the men remaining indispensable in their present employment.

**Dorking Lighting Rebate.**—It was reported at last week's meeting of the Dorking Urban District Council that the local Gas Company were willing to make an allowance of £1 6s. per lamp per annum on the lighting contract from the time the lighting order came into force, and £20 in respect of lamps unlighted prior to the order ; contract rate to be charged for the lamps still lighted. The Council decided to accept the terms ; the Chairman remarking that they were being more favourably treated than at some other places.

**Shutting-Off Gas during Air-Raids.**—It was reported by the Lighting Committee at a meeting of the Burgess Hill Urban District Council that a representation to the Committee had been made on behalf of the Gas Company as to the danger of explosions in houses in consequence of the gas being shut-off in the mains by order of the Military Authorities or a Government Department, and suggesting the publication of a notice warning householders, and stating the precautions that should be observed on such occasions. It was resolved that notice be published in the district in accordance with the suggestion of the Gas Company, and upon the understanding that the Company would deliver similar notices to their consumers throughout the district. The proceedings were confirmed.

The City of Durham Gas Company have declared further dividends of 5 per cent. on the original capital and 3½ per cent. on the additional capital ; making standard dividends of 10 and 7 per cent. respectively for the year.

There was an outbreak of fire last Wednesday morning at Messrs. Newton, Chambers, and Co.'s chemical works, near Barnsley ; but fortunately the flames were confined to two or three buildings. The contents of a tar-tank burned fiercely for several hours ; but buildings containing large quantities of valuable products were saved from the conflagration. The damage to plant and stores was considerable.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official Journal" for April 5.]**

Nos. 4468—4832.

BROWNLEE, R. H.—"Separation of carbon dioxide from other gases." No. 4797.

CHRISTOPHER, J. E.—"Combined gas cooler and washer." No. 4487.

FARGE, F. C.—"Igniting and extinguishing gas-burners." No. 4828.

MYERS, E.—"Recovery of ammonium chloride in the manufacture of gas or coke." No. 4798.

PRICE, H. A.—"Controlling gas-cocks connected with hot-plates, grills, &c." No. 4720.

SHELTON IRON, STEEL, AND COAL COMPANY.—See Myers. No. 4798.

SUGG, J.—See Price. No. 4720.

TWIGG, W. R.—"Automatically regulating proportions of fluid mixtures." No. 4784.

UHLINGER, R. H.—See Brownlee. No. 4797.

## NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order :

The public are informed that newspapers and other printed publications will not be sent to Neutral European Countries unless posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral European Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

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## STOCK MARKET REPORT.

THE Stock Exchange week was quiet and uneventful. On the first two days markets were waiting for the Budget; on the next two they were thinking it over, during which processes business was very quiet, and the tone decidedly dull. But on Friday and Saturday cheerfulness prevailed again, and in some lines a nice recovery was made. Government issues were affected by the great attraction of money to Treasury Bills and by the Chancellor's strong appeal to the public to take up Exchequer Bonds, which did not seem to point to an early date for a new War Loan. Home Rails were easy, but looked firmer before the close. The American Market was dull and heavy under many depressions, among which the demands of labour are not the least. In the Foreign Market, the French loan was again to the front, and after a momentary pause it advanced freely, and closed very firm. Japanese were not doing well. Argentines were very flat, quite unable to find consolation on any side. South Africans had a chequered course, moving with indecision almost from day to day. Even in the Miscellaneous Group the speculative favourites had at times their lean days; but rubber and oil were fairly recovered by the close, and armaments were in demand. With the turn of the quarter, the Money Market became easier; but discount rates were firm. The principal topic of general interest was naturally the Budget, any reference to which in this column must be limited to the great trouble and expense which will be involved if income-tax at the rate of 5s. is to be deducted off all dividend warrants. Another topic of interest to gas proprietors was the "reciprocity" rule approved by the Coal Licensing Committee in regard to coal cargoes for Scandinavia in neutral bottoms. The long-delayed abolition of all remaining minimum prices seems now to be almost within sight. Business in the Gas Market fairly maintained the point of activity attained the week before, and the tendency was wholly favourable. Prices in general showed marked firmness, and some issues made slight advances. Gas Light ordinary was in good demand, and from 73⅜ on Monday rose steadily to 75¼ on Friday and Saturday.

Bargains done for cash during the week were as follows: On Monday, Bournemouth "B" 11$\frac{7}{16}$, 11$\frac{9}{16}$, ditto preference 10, 10$\frac{15}{16}$, Brighton and Hove original 172, 172½, British debenture 69¾, 70, Commercial 4 per cent. 74, European 12$\frac{5}{16}$, 12$\frac{3}{8}$, Gas Light ordinary 73¾, 74, 74¼, ditto debenture 59¾, 60, South Metropolitan 76, 76½. On Tuesday, Commercial 4 per cent. 73¾, Chester 69, Gas Light ordinary 73¾, 74, 74¼, 74½, ditto maximum 61, Primitiva preference 3$\frac{15}{16}$, South Metropolitan 75½. On Wednesday, Brentford debenture 75, 75½, European 12$\frac{5}{16}$, 12$\frac{3}{8}$, 12½, Gas Light ordinary 73¾, 74, 74⅛, 74¼, 74½, ditto preference 74½, 75½, ditto debenture 59$\frac{5}{8}$, 59$\frac{7}{8}$, Imperial Continental 59, Primitiva 43s. 9d., ditto preference 3$\frac{9}{16}$, 3$\frac{5}{8}$, South Metropolitan 75¼, South Suburban preference 81½, 82. On Thursday, Continental Union preference 55, 55¼, 55½, Gas Light ordinary 74$\frac{3}{8}$, Imperial Continental 58¼, 58$\frac{5}{8}$, Primitiva 40s., 41s. 3d., 42s. 6d., ditto preference 3$\frac{9}{16}$, 3$\frac{5}{8}$, 3$\frac{11}{16}$, ditto debenture 83, 83⅛, South Metropolitan, 76½, 76¾. On Friday, British 35$\frac{3}{4}$, 36. Gas Light ordinary 74, 74$\frac{3}{8}$, 75, 75¼, Imperial Continental 58½, 59, Primitiva 40s., 40s. 6d., ditto preference 3$\frac{9}{16}$, South Metropolitan 76½. On Saturday, Gas Light ordinary 74$\frac{3}{4}$, 75, 75¼, ditto debenture 59½, Imperial Continental 58½. Primitiva preference 3$\frac{5}{8}$, 3$\frac{11}{16}$, 3$\frac{3}{4}$.

### ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

| Issue. | Share. | When last Dividend. | Previous Div. on Ordinary & Bonus. | Last Dividend. | NAME. | Closing Prices, July 30, 1914. | Yield on Highest Closing Price. | Lowest and Highest Prices of Bargains. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. | |
| 1,551,868 | Stk. | April 8 | 2½ | 5½ | Alliance & Dublin Ord. | 59—64 | 3 18 2 | .. |
| 374,000 | .. | July 10 | 4 | 4 | Do. 4 p.c. Deb. | 76—79 | 5 1 3 | .. |
| 980,000 | 5 | April 29 | 7½ | 3/- | Bombay, Ltd. | 5¼—6⅜ | 5 17 8 | .. |
| 50,000 | 10 | Feb. 26 | 16 | 15/- | Bourne- 10 p.c. | 29—30 | 5 6 8 | .. |
| 333,110 | 10 | .. | 7 | 7/- | mouth Gas B 7 p.c. | 15—15½ | 4 10 4 | 11$\frac{7}{16}$—11$\frac{9}{16}$ |
| 115,000 | 10 | .. | 6 | 6/- | and Water Pref. 6 p.c. | 13⅜—14 | 4 5 9 | 10—10$\frac{1}{16}$ |
| 151,710 | — | — | — | 4 | 4 p.c. Deb. | .. | — | .. |
| 992,045 | Stk. | Feb. 26 | †14 | †6/- | Brentford A Consold. | 261—266 | 5 5 3 | .. |
| 734,920 | .. | .. | †11 | 55/- | Do. B New | 204—209 | 5 5 3 | .. |
| 55,000 | .. | .. | 5 | 5 | Do. 5 p.c. Pref. | 109—111 | 4 10 1 | .. |
| 221,400 | .. | June 11 | 4 | 4 | Do. 4 p.c. Deb. | 91—93 | 4 6 0 | 75—75½ |
| 217,380 | Stk. | Feb. 26 | 11 | 10⅔ | Brighton & Hove Orig. | 208—218 | 5 3 4 | 172—172½ |
| 244,200 | .. | .. | 8 | 7⅔ | Do. A Ord. Stk. | 154—159 | 5 0 8 | .. |
| 580,000 | 20 | Mar. 26 | 12½ | 22/6 | British | 44—45 | 5 11 1 | 35⅝—36 |
| 120,000 | Stk. | June 26 | 4 | 4 | Do. 4 p.c. Deb. Stk. | 88—90 | 4 8 11 | 69½—70 |
| 245,771 | Stk. | June 26 | 4 | 4 | Buenos Ayres 4 p.c. Deb. | 85—87 | 4 12 0 | .. |
| 100,000 | 10 | — | — | — | Cape Town & Dis., Ltd. | 1¼—2½ | — | .. |
| 100,000 | 10 | — | — | 4/6 | Do. 4½ p.c. Pref. | 4—6 | — | .. |
| 100,000 | Stk. | June 26 | 4½ | 4½ | Do. 4½ p.c. Deb. Stk. | 70—75 | 6 0 0 | .. |
| 157,150 | Stk. | Feb. 26 | 5 | 5 | Chester 5 p.c. Ord. | 108—110 | 4 10 11 | 69 |
| 1,513,280 | Stk. | Feb. 12 | 5/9/6 | 49/4 | Commercial 4 p.c. Stk. | 106—108 | 5 1 3 | 73⅜—74 |
| 560,000 | .. | .. | 5½ | 46/8 | Do. 3½ p.c. do. | 103—105 | 5 1 6 | .. |
| 475,000 | .. | June 11 | 8 | 3 | Do. 3 p.c. Deb. Stk. | 69½—71½ | 4 8 11 | .. |
| 800 000 | Stk. | .. | 4 | 4 | Continental Union, Ltd. | 76—79 | 5 1 3 | .. |
| 200 000 | .. | .. | 7 | 7 | Do. 7 p.c. Pref. | 115—118 | 5 18 8 | 55—55½ |
| 278,420 | — | — | — | 11½ | Croydon B and C 7 p.c. | .. | — | .. |
| 492,270 | Stk | — | 6 | 5½ | Derby Con. Stk. | 123—125 | 4 16 0 | .. |
| 55,000 | .. | — | 4 | 4 | Do. Deb. Stk. | 102—104 | 3 16 11 | .. |
| 1,002,180 | 10 | July 29 | 10 | 10/- | European, Ltd. | 17½ 18 | 5 11 1 | 12$\frac{5}{16}$—12½ |
| 16,827,185 | Stk. | Feb. 10 | 1/17 | 44/- | Gas 4 p.c. Ord. | 98 102 | 4 15 6 | 78⅞—75½ |
| 2,600,000 | .. | .. | 3½ | 3½ | Light 3½ p.c. max. | 76 79 | 4 8 7 | 61 |
| 4,062,235 | .. | .. | 4 | 4 | and 4 p.c. Con. Pref. | 96 99 | 4 0 10 | 74½—75½ |
| 4,674,850 | .. | June 11 | 3 | 3 | Coke 3 p.c. Con. Deb. | 72½—74½ | 4 0 6 | 59½—60 |
| 130,000 | .. | .. | 10 | 10 | 10 p.c. Bonds | .. | — | .. |
| 258,740 | Stk. | Mar. 12 | 5 | 4½ | Hastings & St. L. 3½ p.c. | 87 89 | 5 12 4 | .. |
| 70,000 | 10 | April 29 | 11 | 6 | Hongkong & China, Ltd. | 16½ 16⅝ | 6 11 4 | .. |
| 86,603 | — | — | — | 9½ | Hornsey 7 p.c. | .. | — | .. |
| 131,000 | Stk | Mar. 12 | 7½ | 7½ | Ilford A and C | 151 -154 | 5 2 4 | .. |
| 65,780 | .. | .. | 6⅜ | 5⅞ | Do. B | 115 -118 | 5 8 0 | .. |
| 65,500 | .. | June 26 | 4 | 4 | Do. 4 p.c. Deb. | 92 -94 | 4 5 1 | .. |
| 4,940,000 | Stk | May 14 | 9 | 4½ | Imperial Continental | 150 -160 | 5 12 6 | 58½—59 |
| 1,235,000 | Stk. | Feb. 12 | 8⅛ | 3⅛ | Do. 3½ p.c. Deb. Red. | 84 -86 | 4 1 6 | .. |
| 235,242 | Stk. | Mar. 12 | 6½ | 6½ | Lea Bridge Ord. 5 p.c. | 119 -121 | 5 7 .. | .. |
| 2,498,905 | Stk | Feb. 26 | 10 | 5 | Liverpool 5 p.c. Ord. A | 211—213 | 4 13 11 | .. |
| | | | | | B | 146—148 | 4 14 7 | |
| 806,083 | .. | June 26 | 4 | 4 | Do. 4 p.c. Pr. Deb. Stk. | .. | — | .. |
| 75,000 | 5 | June 11 | 8 | 2/- | Manx & Mediterranean | 4⅛ -4⅜ | 6 9 9 | .. |
| 250,000 | 100 | April 1 | 4½ | 4½ | Met. of Melbourne 4½ p.c. Deb. | 99 -101 | 4 9 1 | .. |
| 541,920 | 5 | May 28 | 4 | 6/- | Monte Video, Ltd. | 11½—12 | 6 13 4 | .. |
| 1,375,892 | Stk. | July 29 | 4½ | 4½ | Newc'tle&G'tesh'd Con. | 94⅝—99½ | 4 10 6 | .. |
| 529,705 | Stk. | June 26 | 3½ | 3½ | Do. 3½ p.c. Deb. | 82 -83 | 4 4 0 | .. |
| 55,940 | 10 | Feb. 26 | 7/14 | 7/8⅜ | North Middlesex 7 p.c. | 14—15 | 5 2 8 | .. |
| 800.000 | Stk. | May 14 | 8 | 8 | Oriental, Ltd. | 117 -122 | 6 11 2 | .. |
| 60,000 | 5 | Mar. 26 | 10 | 1/- | Ottoman, Ltd. | 7⅛ -7⅜ | 6 9 0 | .. |
| 60,000 | 50 | Feb. 26 | 18 | 65/- | Portsea, Island B | 128—131 | 4 19 8 | .. |
| 100,000 | 50 | .. | 19 | 60/- | Do. C | 118—121 | 4 19 9 | .. |
| 52,000 | 50 | .. | 10 | — | Do. D | .. | — | .. |
| 249,980 | 5 | April 29 | 6 | — | Primitiva Ord. | 5⅛—6 | 6 13 4 | 40/—43/9 |
| 499,960 | 5 | June 26 | 8 | 2/6 | .. 5 p.c. Pref. | 4⅞—5 | 5 0 0 | 71/3—75/- |
| 521,600 | 100 | June 2 | 4 | 4 | .. 4 p.c. Deb. | 91—93 | 4 6 0 | 83—83⅛ |
| — | — | — | — | 4 | .. .. 1911 | .. | — | .. |
| 846,198 | Stk. | June 26 | 4 | 4 | River Plate 4 p.c. Deb. | 85—87 | 4 12 0 | .. |
| 150,000 | 10 | May 14 | 6 | 6/- | San Paulo 6 p.c. Pref. | 10½—11 | 5 9 1 | .. |
| 125,000 | 5 | July 1 | 5 | 5 | 5 p.c. Deb. | 47—49 | 5 2 0 | .. |
| 135,000 | Stk | Mar. 12 | 10 | 10 | Sheffield A | 221—224 | 4 9 8 | .. |
| 209,984 | .. | .. | 10 | 10 | Do. B | 222—224 | 4 9 8 | .. |
| 523,500 | .. | .. | 10 | 10 | Do. C | 220—222 | 4 10 1 | .. |
| 90,000 | 1 | May 28 | 9 | 6 - | South African | 10½ -11½ | 7 16 6 | .. |
| 6,603,895 | | Feb. 10 | 5/4 0 | 44/ | South Met.. 4 p.c. Ord. | 111—113 | 4 16 8 | 75½—76½ |
| 1,895,445 | | July 10 | 3 | 3 | Do. 3 p.c. Deb. | 72½ -74½ | 4 0 6 | .. |
| 224,820 | | Feb 26 | 8 | 8 | South Shields Con. Stk. | 157 -159 | 5 6 11 | .. |
| 952,795 | | Feb. 26 | 6 | 4 8/4 | S'th Suburb'n Ord. 5 p.c. | 114 - 116 | 5 8 5 | .. |
| 60,000 | | .. | 5 | 5 | Do 5 p.c. Pref. | 110 -112 | 4 9 3 | 81½—82 |
| 135,000 | — | — | — | 4 8/4 | Do. West Kent. | .. | — | .. |
| 187 558 | | June 26 | 5 | 5 | Do 5 p.c. Deb. Stk. | 116—118 | 4 4 9 | .. |
| 629,740 | Stk | May 14 | 5 | 5 | Southampton Ord. | 99 -102 | 4 18 0 | .. |
| 120,000 | Stk | Feb 12 | 7½ | 7½ | Tottenham A 5 p.c. | 135 -138 | 5 9 8 | .. |
| 732,276 | | .. | 6 | 6 | District B 3½ p.c. | 115 -117 | 5 3 7 | .. |
| 181,255 | | June 26 | | 4 | 4 p.c. Deb. | 87 -89 | 4 9 11 | .. |
| 182,380 | 1 | Dec. 30 | 3 | — | Tuscan, Ltd. | 5 -6 | 8 6 8 | .. |
| 149,900 | 10 | July 1 | | 5 | Do. 5 p.c. Deb. Red. | 93 -95 | 5 5 3 | .. |
| 296.478 | Stk | Mar. 12 | | 5 | Tynemouth, 5 p.c. max. | 108½—109½ | 4 11 4 | .. |
| | | | | | Wandsworth, Wimbledon, and Epsom— | | | |
| 80,000 | Stk | Feb. 26 | 8⅝ | 78/9 | Wandsworth A 5 p.c. | 151—156 | 5 7 4 | .. |
| 255,636 | .. | .. | 6⅞ | 63/9 | .. B 3½ p.c. | 129—134 | 5 2 7 | .. |
| 108,075 | .. | .. | 5/17/ | 55/1½ | .. C 3½ p.c. | 110—115 | 5 2 0 | .. |
| 852,000 | .. | .. | 6½ | 57/6 | Wimbledon 5 p.c. | 117—122 | 5 0 5 | .. |
| 98,000 | .. | .. | 6⅝ | 63/9 | Epsom 5 p.c. | 121—126 | 5 [illegible] 9 | .. |
| 88,416 | | June 26 | 4 | 3 | 3 p.c. Deb. Stk. | 66—69 | 4 6 11 | .. |

* Ex. Div. † Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

## WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

### Appointments, &c., Vacant.

MANAGER. Swadlincote Gas Department. Applications by April 18.
MANAGER (Coke Oven Plant). No. 6169.
MANAGER (6 Mill:on Works). No. 6167.
RENTAL AND GENERAL CLERK. No. 6168.

### Gas-Works for Sale.

KETTON GAS-WORKS. April 18. Particulars of Messrs. Richardson, Stamford.

### Plant, &c. (Second Hand), for Sale.

ENGINES AND EXHAUSTERS. Preston Gas Company.
RETORTS. No. 6166.

### TENDERS FOR

### Coal.

CARLISLE GAS DEPARTMENT. Tenders by April 15.
EAST DEREHAM URBAN DISTRICT COUNCIL. Tenders by April 20.
OLDHAM CORPORATION
RHYL URBAN DISTRICT COUNCIL. Tenders by April 25
ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY. Tenders by April 19.
SIDMOUTH URBAN DISTRICT COUNCIL. Tenders by April 25.
TORQUAY TOWN COUNCIL. Tenders by April 25.
WESTON-SUPER-MARE GAS COMPANY. Tenders by April 13.


### BOOKS AND LEAFLETS

TO BE OBTAINED OF

WALTER KING, 11, Bolt Court, Fleet St., E.C.

CONVERSION OF MEASUREMENTS IN DIFFERENT UNITS.—By R. H. SMITH. *Price 7s. 6d.*

BIRMINGHAM CORPORATION (Windsor Street) GAS-WORKS.—By CHARLES HUNT, M.Inst.C.E. *Price 21s.*

GAS MANUFACTURE AND GAS LIGHTING.—By HENRY O'CONNOR, Assoc.M.Inst.C.E., &c. A Course of Five Lectures delivered before the Royal Scottish Society of Arts. *Price 1s. 6d. post free in the United Kingdom.*

ANALYSES OF SCOTCH COALS, CANNEL, SPLINT, SHALE, &c., USED IN THE MANUFACTURE OF GAS.—By (the late) Dr. WILLIAM WALLACE, of Glasgow. *Price 1s.*

CALORIFIC POWER OF GAS.—By J. H. COSTE. *Price 6s.*

*Other Books supplied (Post Free) at Published Prices.*

## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.**

**TERMS OF SUBSCRIPTION to the "JOURNAL."**
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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

**Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.**


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**O'NEILL'S OXIDE**
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

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**"VOLCANIC" FIRE CEMENT.**
Resists 4500° Fahr. Best for GAS-WORKS.
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WET AND DRY METERS.
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STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.

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**THE very best Patent Grids for Holding** Oxide Lightly.
See Illustrated Advertisement, Feb. 22, p. 440.

MEWBURN, ELLIS, AND PRYOR.
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Telegrams: "Patent London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on Tyne.

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**SPECIALLY prepared for the manu**facture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.,
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Telegrams—"HYDROCHLORIC, FEN. LONDON."
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**D. ANDERSON AND COMPANY,**
GAS LIGHTING ENGINEERS AND CONTRACTORS.
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2396 HOLBORN.

**R. & G. HISLOP,**
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL TESTING PLANT BOILER FIRING.
Communications should be addressed to UNDERWOOD HOUSE, PAISLEY.

**GAS-WORKS requiring Extensions** should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

**SULPHATE OF AMMONIA** SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
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Telegrams—"SATURATORS BOLTON." Telephone 0848.

**J. & J. BRADDOCK (Branch of Meters** Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
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**"GAZINE" (Registered in England and** Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the Enrichment of Gas.
Manufactured and Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agents, F. J. NICOL & Co., Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.


SWADLINCOTE DISTRICT URBAN DISTRICT COUNCIL.

**THE above Council invite Applications** for the Position of MANAGER of the Council Gas-Works. The Annual make of Gas approximates about 57 Million Cubic Feet.
The Salary offered is £200 per Annum, and the Appointment will be Terminable on Three Months' notice from either side.
Applications, stating Age, Experience, and present Position, and accompanied by *copies* of not more than Three recent Testimonials, to be addressed to me, endorsed "Gas-Works Manager," so as to reach me not later than Twelve Noon on Tuesday, the 18th of April, 1916.

W. A. MUSSON,
Clerk to the Council.
Council Offices, Swadlincote.


**THOROUGHLY competent Manager** wanted for a large By-Product Coke-Ovens Plant. Only Energetic and Capable Men with Practical Experience in Manufacturing and Dealing with Coke, Tar Distillation, Ammonia (Sulphate and Concentrated Liquor), Crude and Rectified Benzol, need apply.
No Person resident more than ten miles away, or already engaged on Government work, will be engaged.
Apply, by letter, stating Age, Experience, Qualification, Salary required, and References, to No. 6169, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, by a Gas Company in** South Wales, a PRACTICAL MANAGER for Works of about 6 Millions per Annum. Stoker kept. Salary 40s. per Week and Commission, with House, Coal, and Gas.
Apply, by letter, enclosing *copies* of Two Testimonials, to No. 6167, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

**WANTED for duration of War,** RENTAL and GENERAL CLERK for Water and Gas Company, South Coast of England (ineligible for Service). Salary, 32s. 6d. and overtime.
Apply, by letter, with full Particulars, to No. 6168, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

**THE Preston Gas Company have for** Disposal two Sets of Gwynne and Beale's ENGINES and EXHAUSTERS, each of 50,000 cubic feet capacity. May be seen in use at any time on Application.

**FOR SALE—70 Retorts, Ω-shaped** 21½ in. by 14 in., with Fast Ends, 9 ft. 11 in. long over all. Made for a Foreign Gas Company, but not required on account of the War. Best Stourbridge Quality and Manufacture.
Apply No. 6166, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

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We are in a position to Supply Oxide of Iron promptly, and invite Enquiries.
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Tins for sale to Consumers.
In Bulk for Works Use.
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ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY.

GAS COAL.

**THE Directors invite Tenders for the** Supply of 21,000 Tons of GAS COAL, to be Delivered between the 1st of July, 1916, and the 30th of June, 1917.
Further Particulars, with Forms of Contract and Tender, may be had on Application.
Sealed Tenders, marked "Coal," are to be Delivered to me at these Offices not later than noon on Wednesday, April 19, 1916.
The Directors do not bind themselves to accept the lowest or any Tender.

C. VALON BENNETT,
Engineer and General Manager.
95, High Street, Rochester,
March 31, 1916.

WESTON-SUPER-MARE GASLIGHT COMPANY.

**THE Directors of the above Company** invite TENDERS for the Supply of 25,000 Tons of Screened GAS COAL and NUTS during the Twelve Months ending June 30, 1917.
Particulars and Tender Forms may be obtained from the undersigned.
Tenders to be sent in not later than First Post Thursday morning, April 13, 1916.

JAMES TAYLOR,
Engineer.
Gas-Works, Weston-super-Mare,
March 29, 1916.

CITY OF CARLISLE.

**THE Gas Committee of the City of** Carlisle are prepared to receive TENDERS for the COAL (about 35,000 Tons) and CANNEL (about 5000 Tons) required at their Works during One Year commencing July 1 next.
Tenders, endorsed Coal and addressed to the Chairman of the Gas Committee, to be Delivered not later than Saturday, April 15, 1916, at the Gas-Works Offices, Victoria Viaduct, Carlisle.
The lowest or any Tender not necessarily accepted.
Forms of Tender and other Particulars may be obtained on Application to the undersigned.

E. GEORGE HUTCHINSON,
Engineer and Manager.
Gas-Works, Carlisle,
April 5, 1916.

RHYL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

**THE Rhyl Urban District Council are** prepared to receive TENDERS for the Supply of 5200 Tons of Screened GAS COAL and 100 Tons of Best HOUSE COAL, to be Delivered f.o.r. Rhyl during the Eleven Months ending June 30, 1917, in such quantities and at such times as may be required.
Form of Tender and Particulars of Condition may be had on Application to Mr. Leonard G. Hall, Assoc.M.Inst.C.E., Gas Engineer's Office, Paradise Street, Rhyl.
Sealed Tenders, endorsed "Tenders for Coal," to be Delivered to me, the undersigned, not later than April 25, 1916.
Approved security will be required.
The Council do not bind themselves to accept the lowest or any Tender.

(Signed) ARTHUR ROWLANDS,
Clerk to the Council.
Council Offices,
Clwyd Street, Rhyl,
April 5, 1916.

H. & J. DEMPSTER, LTD. 54 & 2396 Manchester. KENTISH TOWN, N.W. FOR PATENT SLOT METER TAPS & OTHER BOOKS.